hitchcock publication

January 1959

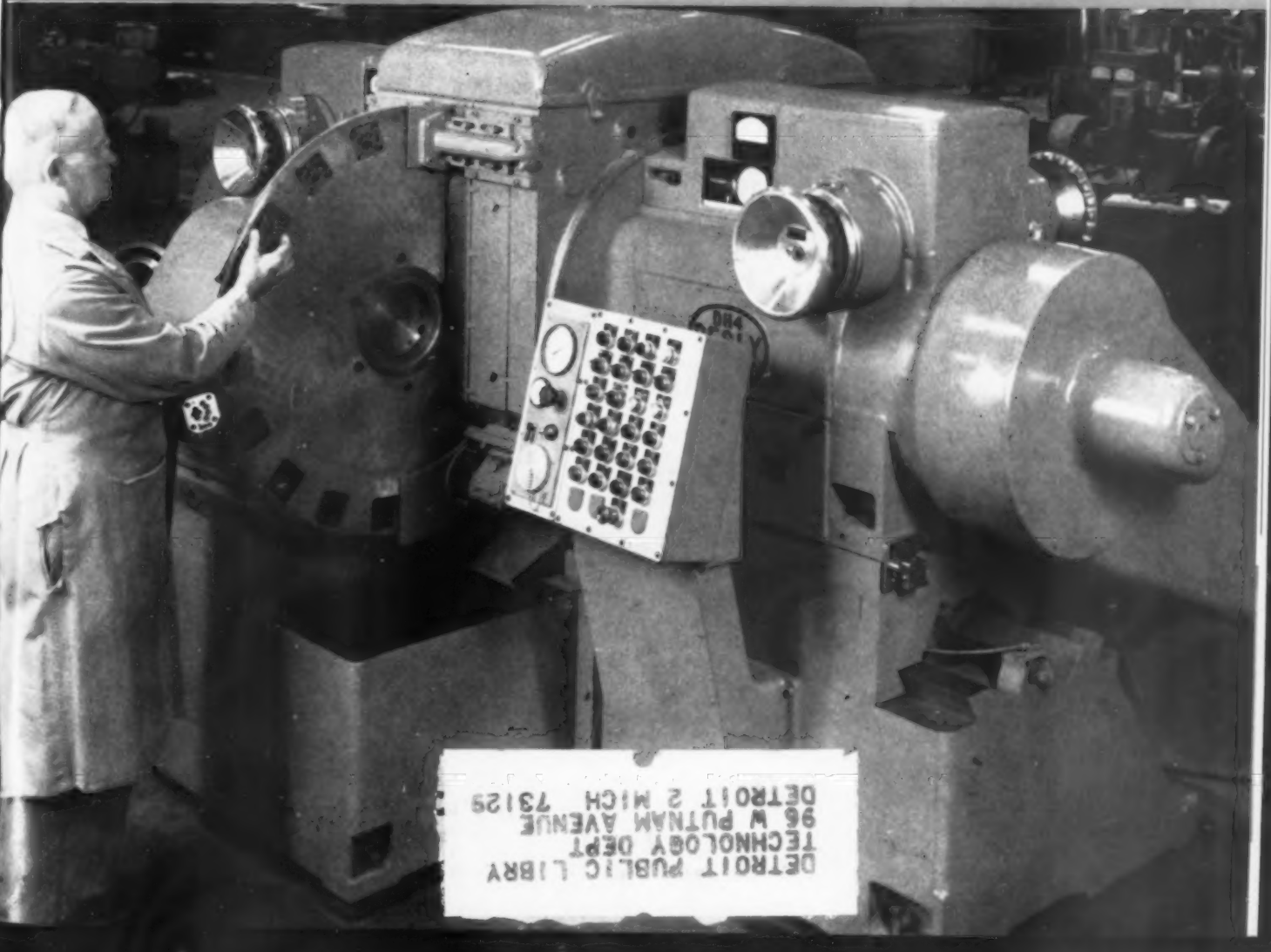
grinding and finishing

PUBLIC LIBRARY
JAN 27 1959
DETROIT

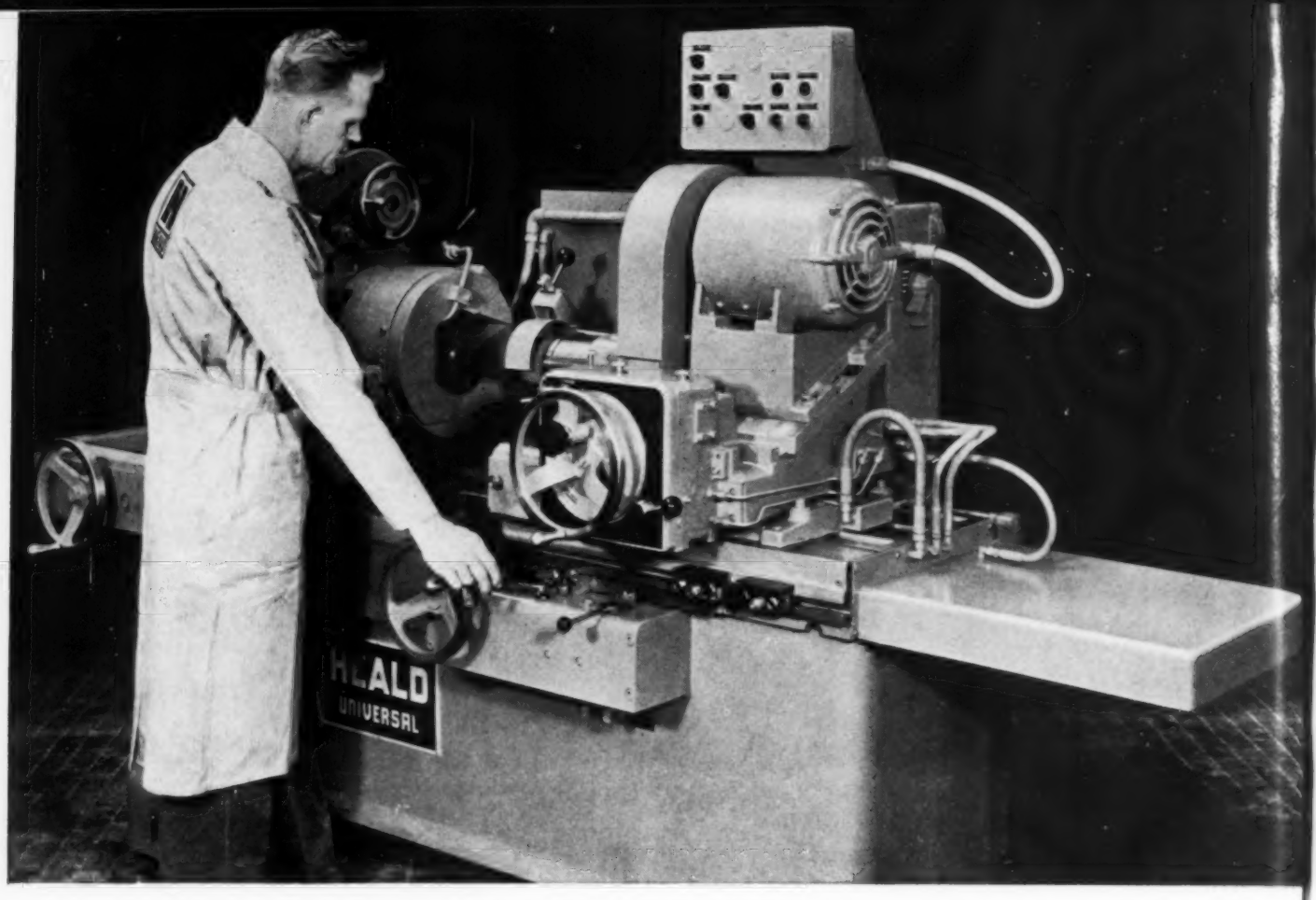
also in this issue

- A Special Report on the State of the Industry
- Residual Stresses Produced by "Up Grinding" and "Down Grinding"
- Thin Wall Diamond Bits for Hard Materials

Accuracy, Automation Prompt Design of New Double Disc Grinder



DETROIT PUBLIC LIBRY
TECHNOLOGY DEPT
96 W PUTNAM AVENUE
DETROIT 2 MICH 73129

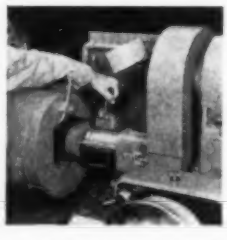


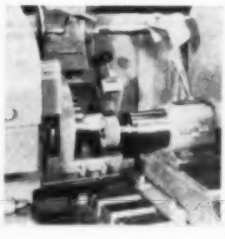
Presenting the Heald Model 273-A NEW UNIVERSAL

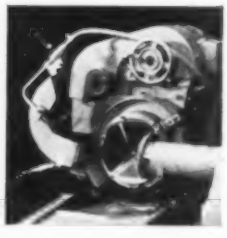
a completely new machine with

1959 PERFORMANCE

and a 1947 PRICE TAG







. . . for I. D., O. D. and Rotary Surface Grinding

THIS is the machine that "couldn't be built" — a better, more *versatile* general purpose grinder that costs about *half* as much as comparable machines today, and *less* than similar machines (with fewer features) cost in 1947!

Here are just a few of its outstanding features:

Hydraulic Anti-Friction Ways — table and cross slide are supported on "pockets" of pressurized oil. A quarter-pound force moves the 1800-pound table.

20-Inch Table Travel — more than in any previous standard base Heald universal grinder.

Workhead Swivels 90 Degrees — permitting rotary surface grinding as well as I.D. and O.D. grinding.

Three Wheelhead Positions — standard, 2" forward or 7½" forward for greater grinding versatility.

Vari-speed Workhead Drive — infinitely variable from 150 to 450 rpm.

Swing Inside Standard Guard — 12".

Standard O.D. Grinding Capacity — 12".

Accuracy — holds tolerances within .0001" in routine production and within .000050" in special cases.

Ask your Heald engineer for the complete UNIVERSAL story. Then compare its performance and cost with *any other machine* available today. And if you have a Heald toolroom grinder that's 10 to 30 years old, you can now replace it profitably — at a cost that's *too low* to pass up.

HEALD

It PAYS to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

. . . Wherever abrasive operations are performed

grinding and finishing

Contents • January, 1959

EDITORIAL STAFF

William F. Schleicher
vice president and editorial director

M. M. Patterson
managing editor

Richard L. McKee
associate editor

Darrell Ward
field editor

Margaret Moffett
assistant editor

BUSINESS STAFF

R. C. Van Kampen
president

Vincent C. Hogren
executive vice president

J. E. Hitchcock
vice president

Oliver S. Pepper
business manager

John S. Todd
production director

F. S. Larson
advertising production manager

Robert L. Spreckels
circulation manager

Bruce B. Howat
marketing director

L. M. Schroeder
art director

Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.

Copyright 1959, by Hitchcock Publishing Co., Wheaton, Ill. Phone MOntrose 5-1000. Cable address: HITCHPUB Accepted as controlled circulation publication at Pontiac, Illinois.

BPA

FEATURE ARTICLES

The State of the Industry 22

Top executives give their frank appraisals of last year's biggest developments, next year's sales and technical progress outlook for abrasives, grinding machines and equipment. By the Editors of GRINDING and FINISHING.

Residual Stresses Produced by UP Grinding and DOWN Grinding 30

The latest report on an intensive ten-year research program on residual stresses in ground surfaces, sponsored by the Grinding Wheel Institute at Mellon Institute of Industrial Research. By John A. Mueller.

Accuracy, Automation Prompt Design of New Double Disc Grinder 36

Automated disc grinder utilizes a unique quill type spindle and new dressing technique in advanced machine design to obtain accuracies up to .0001".

Thin Wall Diamond Bits for Hard Materials 42

A unique application of diamonds, primarily on non-metallic materials now, but with high potential in certain phases of metalworking. By W. H. Hampton.

World's Largest Vertical Honing Machine Delivered 46

Specifications and description of a vertical honing machine, 44 feet tall, which has recently been installed in Europe.

SHOP HINTS 34

Editors' Note: In order that adequate coverage might be given to the report on the grinding and finishing industry (pages 22-29), one department, "Grinding and Finishing Around the Country," has been eliminated this month.

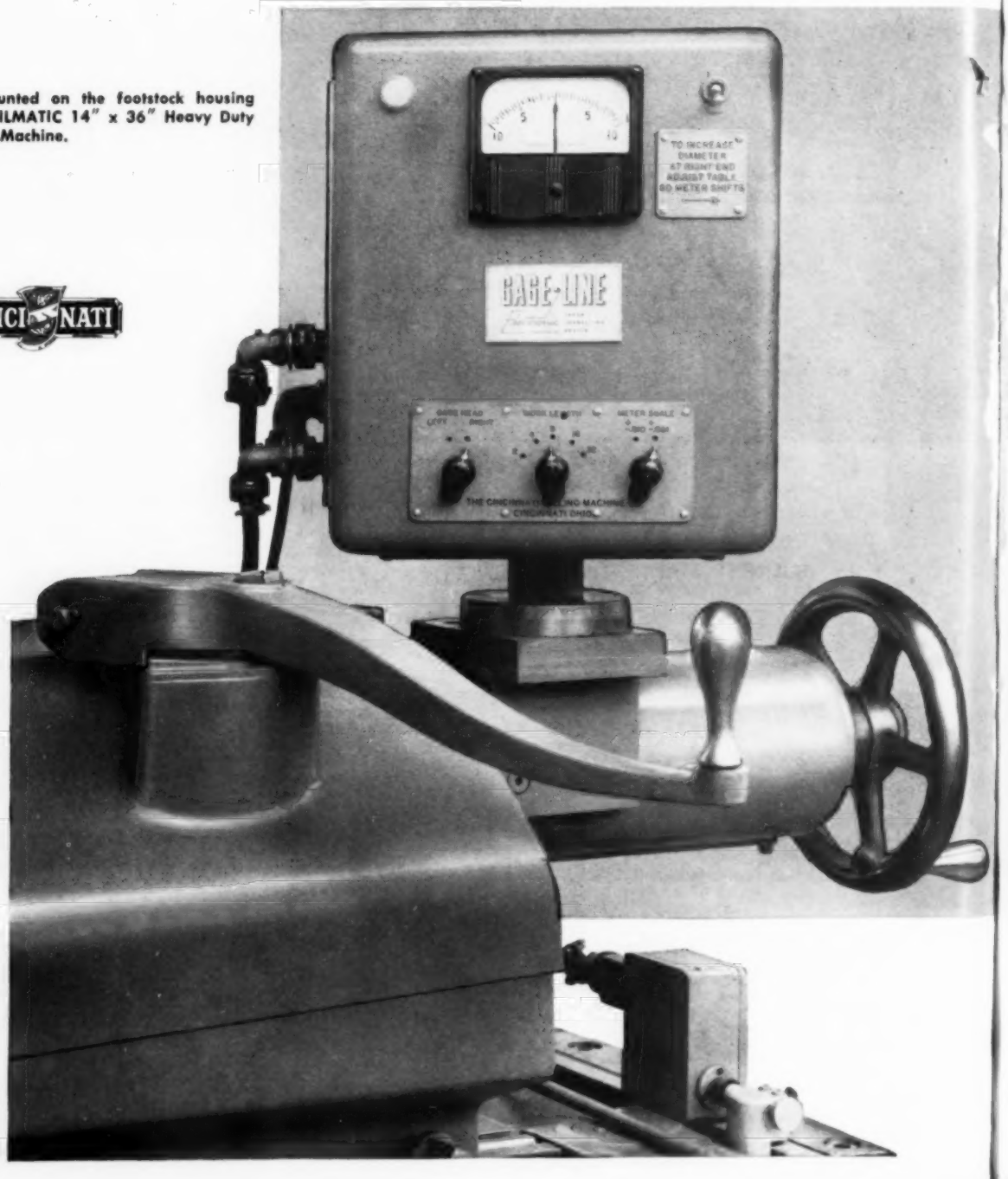
DEPARTMENTS

Letters 4
News of Metalworking 14
Editor's Page 21
Grinding Safely 41
Questions & Answers 45
Free Literature 47
New Equipment and Materials 52
Abrasive Society News 63
News of Industry 64

Advertisers Index and District Managers Listed on Return Card Insert

CINCINNATI

gives you positive correction of



Gage-Line unit mounted on the footstock housing of a CINCINNATI FILMATIC 14" x 36" Heavy Duty Universal Grinding Machine.

CINCINNATI

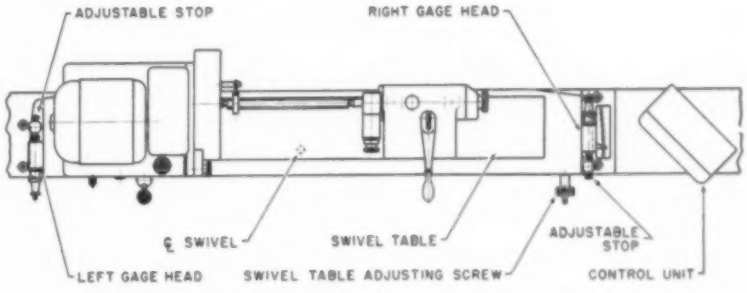
CINCINNATI®

CENTERTYPE GRINDING MACHINES • CENTERLE
MICRO-CENTRIC GRINDING MACHINES • CHUCKI

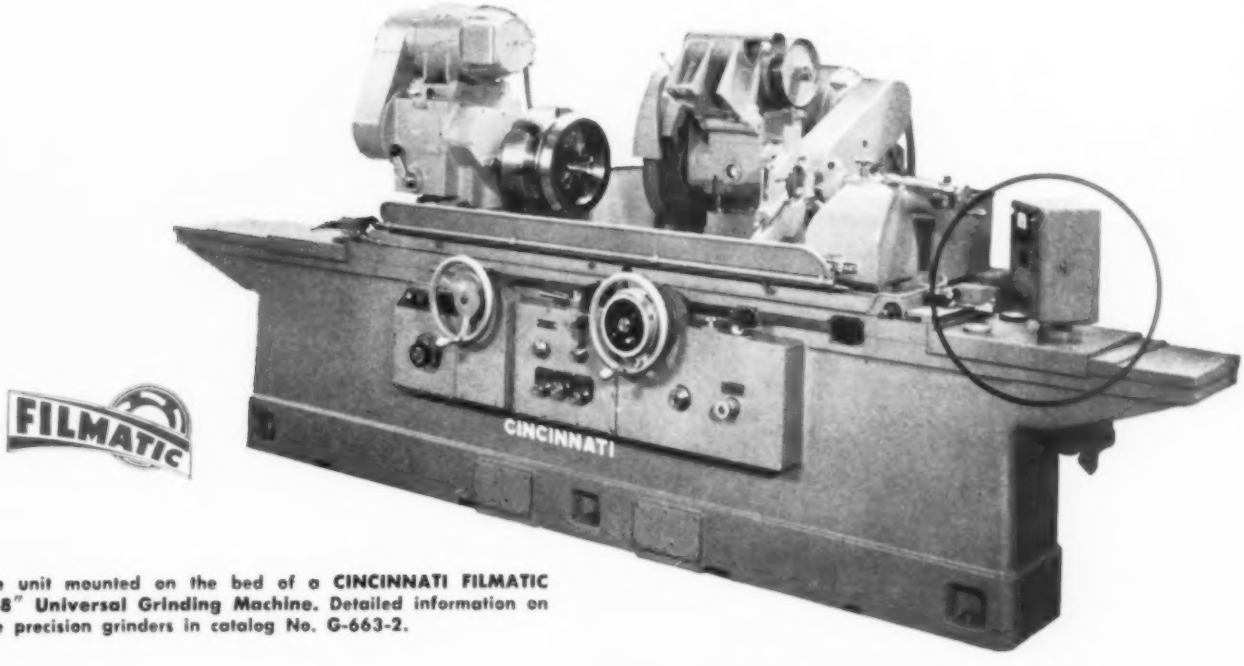
GAGE-LINE UNIT

taper ... quickly; accurately

Taper is an elusive factor in centertype grinding. The cut and try method of eliminating or correcting it is expensive and quite often wasteful of nearly-finished parts. Gage-Line is Cincinnati's answer to precise taper control. It is an electronic taper correcting unit which eliminates trial and error with amazing sureness and accuracy. ¶ Here's the way it works. A gage head is mounted on each end of the table, and an electronic control unit is mounted on the right-hand end of the machine. When the swivel table is adjusted, the control unit electronically translates the signal from each gage head to a graduated meter, reading direct for amount of movement and length of workpiece. Selector switches located on the control unit compensate the meter for different lengths of work, determine the range of magnitude desired on the meter, and select the signal from either the left-hand or right-hand gage head. ¶ Gage-Line unit is another forward step by Cincinnati in their continuing efforts to improve the accurary and reduce the cost of precision centertype grinding. Gage-Line is available for all CINCINNATI FILMATIC 4" to 14"L Plain Grinding Machines and 10" to 18" Universal Grinding Machines having between-center lengths up to 48" inclusive. Want more information? Ask for brochure G-687.



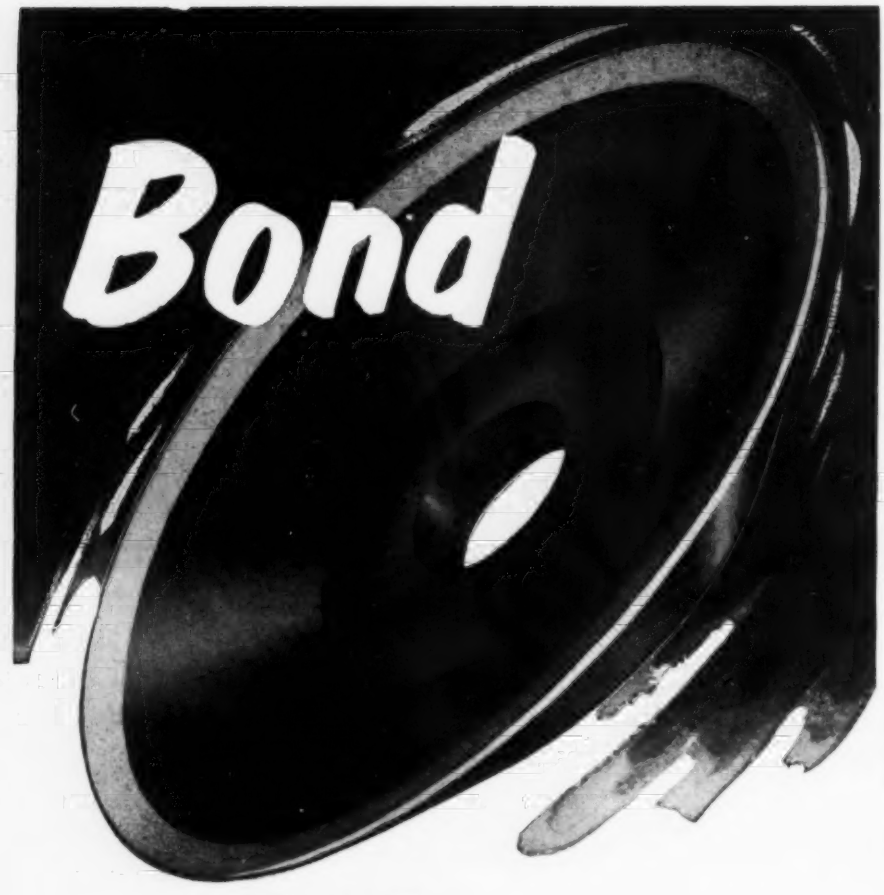
Gage-Line elements are located for maximum convenience and visibility in setting up the machine.



Gage-Line unit mounted on the bed of a CINCINNATI FILMATIC 18" x 48" Universal Grinding Machine. Detailed information on these fine precision grinders in catalog No. G-663-2.

NDING MACHINES • ROLL GRINDING MACHINES
NDERS • CENTERLESS LAPPING MACHINES

GRINDING MACHINE DIVISION
The Cincinnati Milling Machine Co.
Cincinnati 9, Ohio



the **BIG** difference
in DIAMOND WHEELS

BOND... the big reason why diamond wheels by J. K. Smit meet your requirements

EXPERIENCE... gained from many years of testing cementing mediums and fillers

QUALITY CONTROL... that insures even distribution of diamond particles throughout every wheel

ONE SOURCE... that manufactures all types of metal, vitrified and resinoid bond diamond wheels

Your copy of Catalog #54 is awaiting your request. Call us direct on any standard or special application

J. K. SMIT & SONS, INC.
HOME OFFICE AND PLANT
MURRAY HILL NEW JERSEY
DETROIT: TORONTO, CANADA

Additional plants in London, Paris, Amsterdam and Toronto, Canada

Letters to the Editor

Editor's Acknowledgment:

For the article, "Predicting Abrasive Production from Steel," by Otto L. Forchheimer, which appeared on pages 26-29 of the December issue of GRINDING and FINISHING, data concerning net shipments of finished steel products were furnished by the American Iron and Steel Institute through the courtesy of Mr. H. C. Rossrucker.

Acknowledgment of this source was unfortunately omitted when the article was printed last month.

Grinding at Timken Plant

We would greatly appreciate permission for republication of your article, "Grinding at New Timken Bearing Plant," from the July 1958 issue of GRINDING and FINISHING.

Our office in Madras reports that the editor of *Southern Railways Magazine* (published in Tanjore, India) would like to reprint your article. Since we believe the article also may be of interest in other areas of the world, may we have permission for its republication (in English and in translation) by the U.S. Information Service and the local press outside the United States and Canada? Credit, of course, will be given to you and the initial publisher.

Garrett K. Sias, Acting Chief
News and Features Branch
U.S. Information Agency
Washington, D.C.

Life of Diamond Dressers

An article, entitled "Increased Life and Accuracy of Diamond Dressers Achieved by Diamond Cutting and Orientation," which appeared in the April, 1958, issue of GRINDING and FINISHING, has evoked considerable interest because of current difficulties with excessive diamond wear.

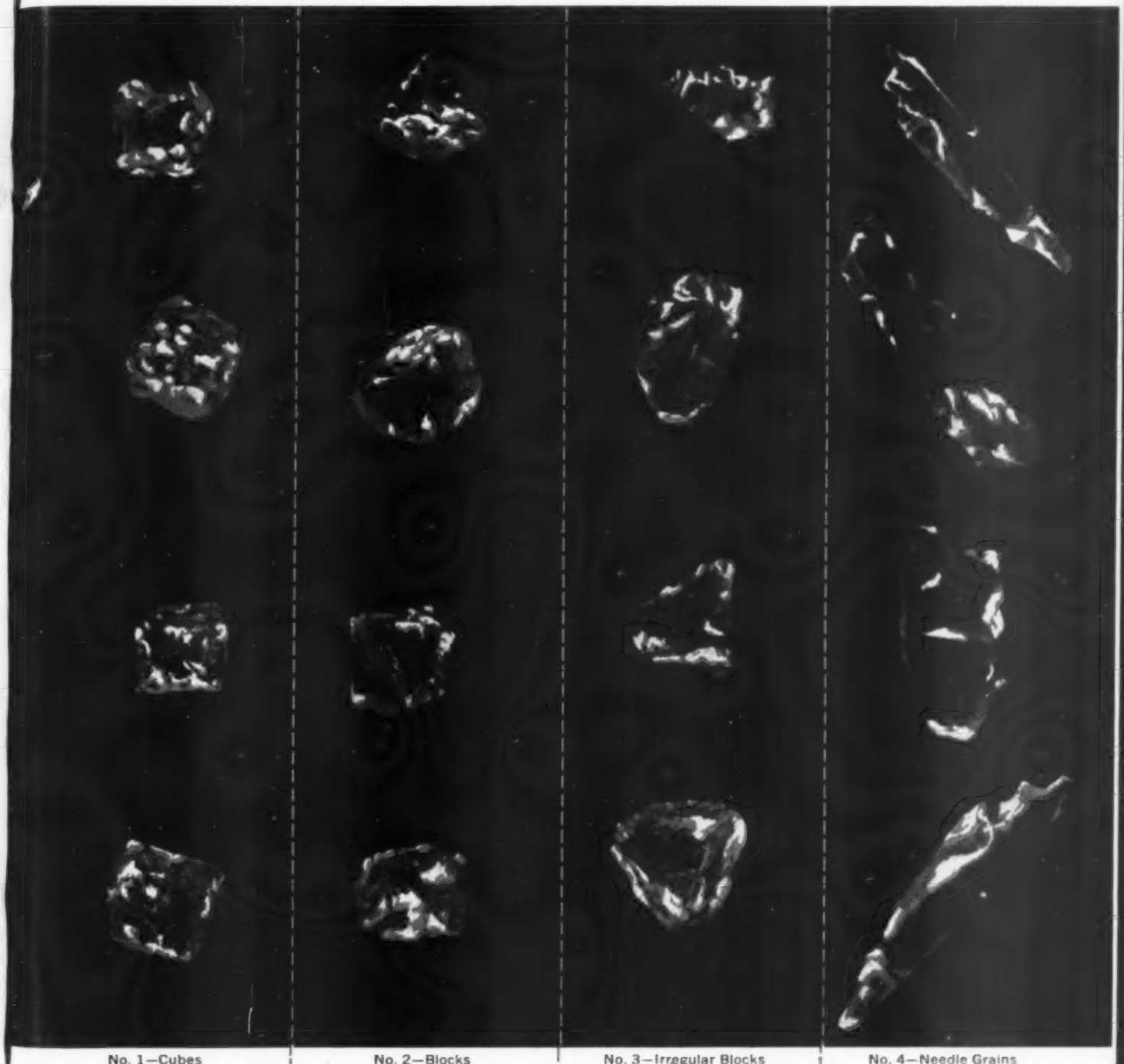
If there are reprints of this article available, it would be appreciated if ten copies could be furnished the writer for distribution to the engineering, plant supervisory, and purchasing personnel directly concerned.

Alfred N. Ackerson
Div. Tool & Process Engr.
Clark Equipment Co.
Jackson, Mich.

NOW AVAILABLE

GRADED NATURAL DIAMOND MESH

FOR EFFICIENT GRINDING



No. 1—Cubes | No. 2—Blocks | No. 3—Irregular Blocks | No. 4—Needle Grains

When natural diamond is crushed by our controlled methods, four mesh shapes are generated: No. 1 (Cubes); No. 2 (Blocks); No. 3 (Irregular Blocks); No. 4 (Needle Grains).

Increased grinding efficiency can be obtained by using mesh sizes with a controlled shape distribution.

This new service extended to the manufacturers of diamond wheels by Industrial Distributors (Sales), Limited, ensures a consistent supply of this material in graded mesh sizes in the wheels supplied to you.

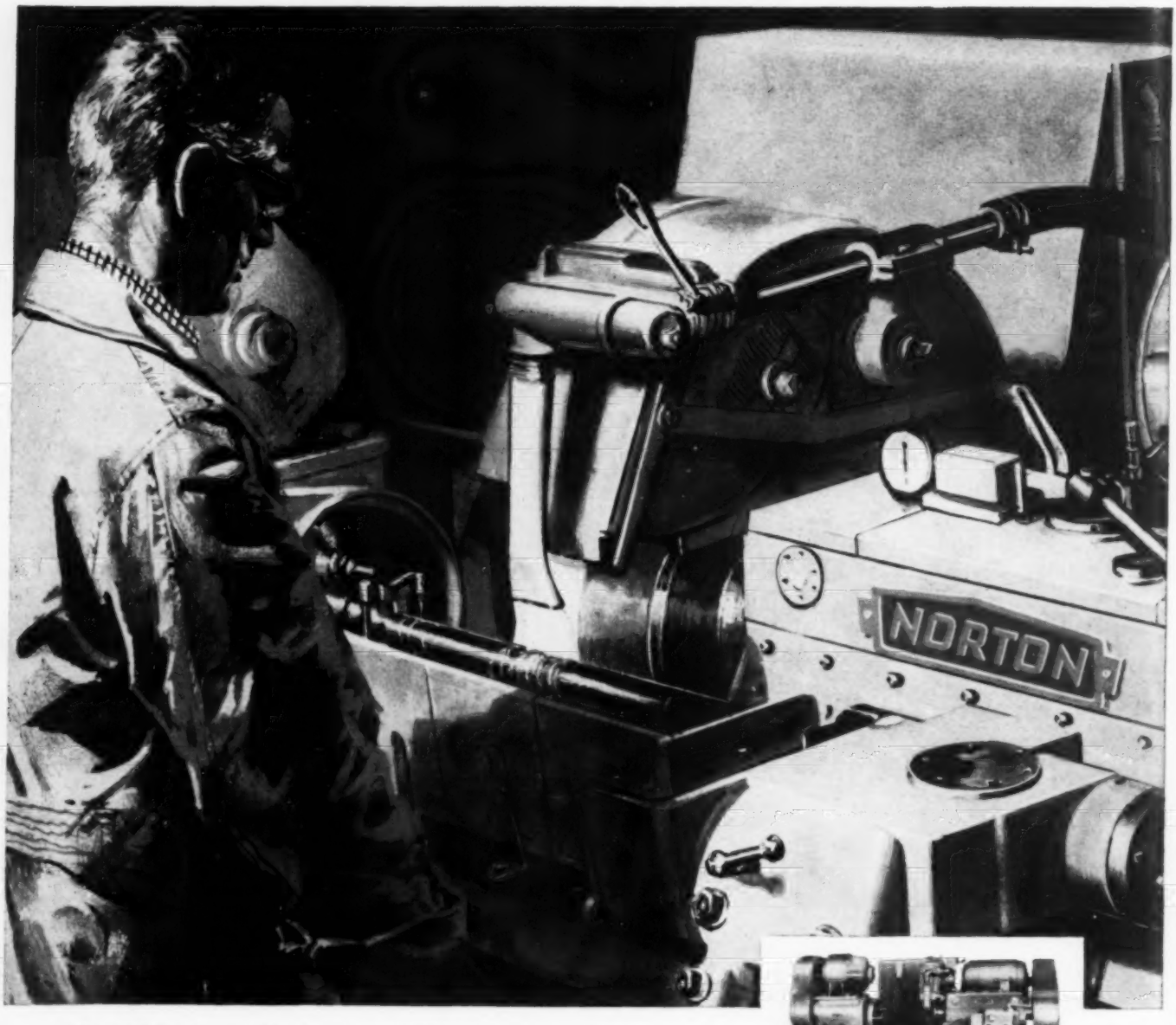
PARTICLES GREATLY MAGNIFIED TO SHOW SHAPE

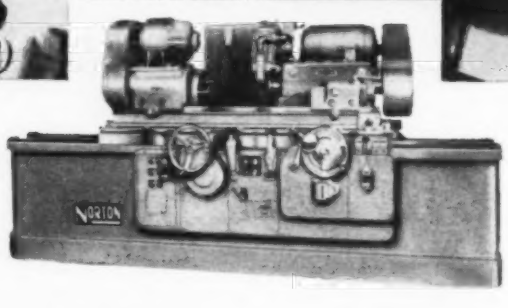
YOU CAN DEPEND ON NATURAL DIAMONDS

INDUSTRIAL DISTRIBUTORS (SALES), LTD.

Norton Type CTU Cylindrical Grinders knock out production lags . . . to give you bigger grinding profits

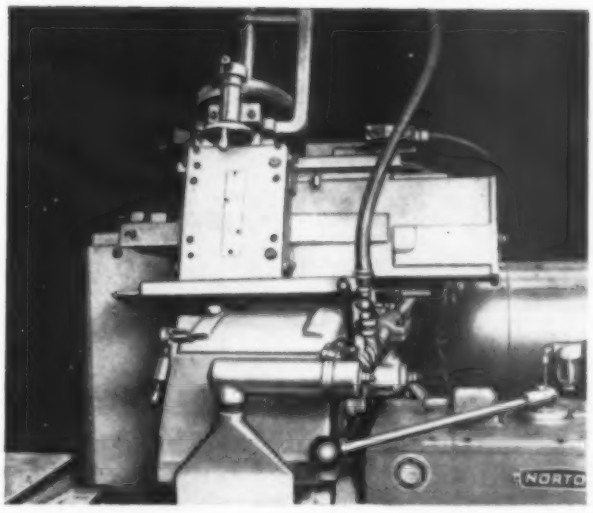
Standard Norton Type CTU Semiautomatic Grinders in 4″ to 14″ swings have the features you need to raise your profits. Automatic accessories for wheel truing, work loading and many other functions are available to further reduce manual effort and operator attention.



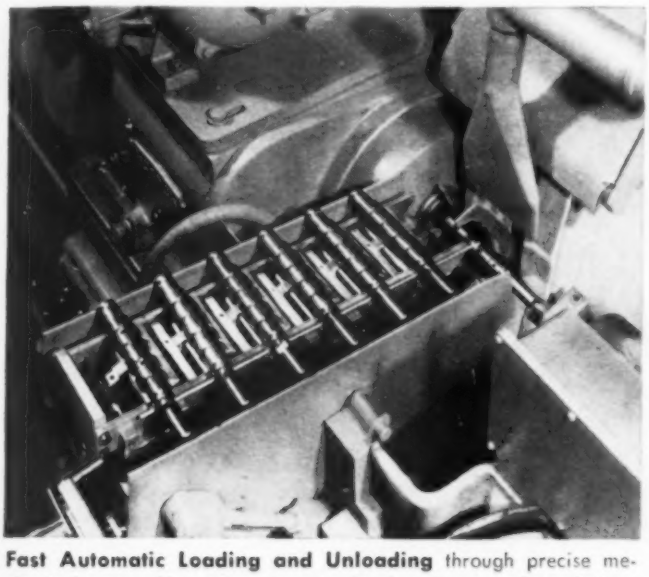


This 10″ Norton machine is one of the CTU family of general purpose and semiautomatic precision cylindrical grinders — top performers in anybody's book. They lick production lag with a unique combination of speed, accuracy, flexibility and durability. Production line and job shop users report that Norton CTU's have doubled production, replaced several machines, eliminated extra operations. Write for Catalogs 531, 1488 and 1787.

These accessories boost your profits... give you the "Touch of Gold"



Automatic Truing knocks out time delay of manual operation. Abrasive and diamond savings provide an added "Touch of Gold."



Fast Automatic Loading and Unloading through precise mechanical means. You rule out production lags from worker's fatigue and enable your operators to attend more than one machine.

Automatic Wheel Contact Accelerator reduces over-all cycle time and speeds production. You never "grind air" because wheel head movement adjusts to grinding rate only after the grinding wheel touches the work.

Automatic Wheel Wear Compensator eliminates interrupted production. It compensates for reduced wheel diameter by resetting the wheel head at each truing — whether or not operator is present.

Norton CTU Grinders and Accessories are sound investments for increased profits. They can raise your production by 100%. Remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

***To Economize, Modernize with* NEW**

NORTON

GRINDERS and LAPPERS

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

District Offices: Worcester • Hartford • Cleveland • Chicago • Detroit

Howard Beacham tripled wheel life,

Howard Beacham has been a Bay State Abrasive Engineer for fifteen years and his total experience is double that. He's worked on grinding problems that have involved every type of metal in jobs as tiny as miniature bearings and as big as the world's largest air compressors and steam turbines.

cut dressing frequency in half at New Process Gear

The closer you get to automation, the more it hurts to have production interrupted. That was the principal problem at Chrysler's New Process Gear Division where semi-automatic grinding of flats on truck transmission shafts was halted by wheel dressings every eleven pieces.

The three competitive wheels used in this simultaneous "cam grinding" operation wore down so fast they had to be replaced every week. And, on top of that, an alarming number of shafts were being cracked during the grinding operation.

Bay State's Howard Beacham was called in on the job. He specified a trio of Bay State wheels that produced really spectacular results.

Production jumped to twenty-five perfect shafts per dressing and wheel life went up to three full weeks. Finish was excellent, too.

Why not talk to your own Bay State representative next time you have a grinding problem? Like Howard Beacham he's a trained specialist. *Better grinding at lower cost . . . that is his business.*

Operator Henry Kotas runs grinder equipped with one 24 x 1-21/32 x 12 and two 24 x 1-3/4 x 12 Bay State wheels. The three wheels simultaneously grind flats on main shaft for 5-speed truck transmission.

(*Above*) Manufacturing Engineer Wiley Bell and Plant Superintendent Nelson Fisk examine finished truck transmission shaft.

BAY STATE WHEELS of PROGRESS

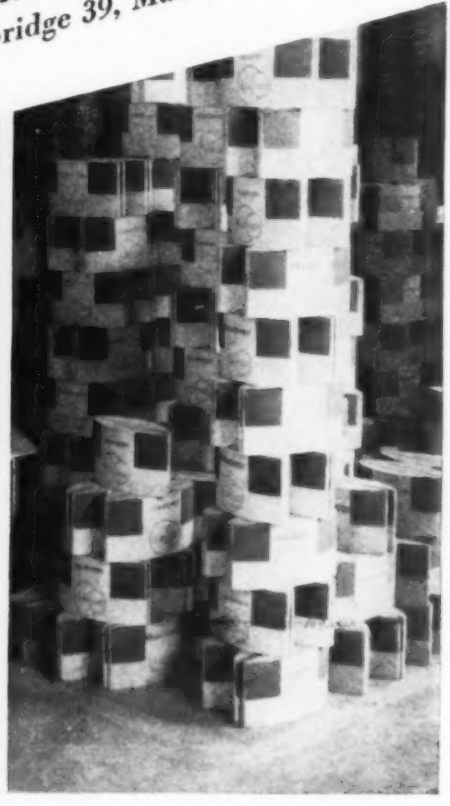
BAY STATE ABRASIVES

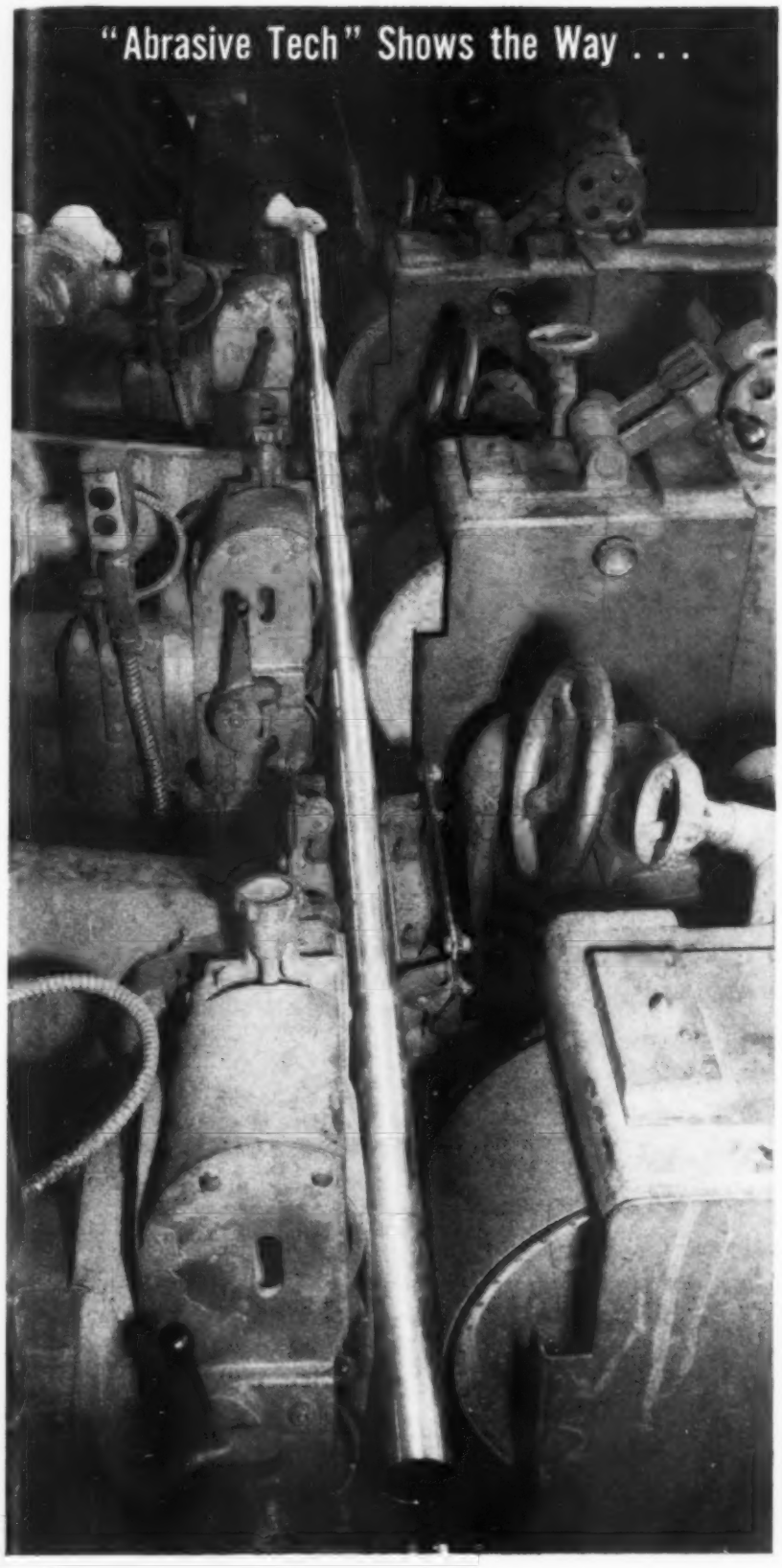
Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

Blanchard is your one best source of information regarding grinding wheel applications for Blanchard surface grinding. Our knowledge and experience can be extremely valuable to you . . . and it's yours for the asking! An ample inventory of standard specifications is always on hand, therefore deliveries of Blanchard wheels are prompt and complete.

Send today for "The Art of Blanchard Surface Grinding", 4th edition, which describes the complete line of vitrified, silicate and resinoid bonded wheels and segments and the proper selection for Blanchard vertical spindle surface grinders.

THE BLANCHARD MACHINE COMPANY
64 State Street Cambridge 39, Mass., U.S.A.





Faster polishing of steel tubing—

By using RESINALL METALITE cloth belts in a sequence of grits on a 3-head centerless grinder, stainless steel tubing is polished in a *single* pass.

An "Abrasive Tech" method like this may speed your production, save you time and money. If you have a production or cost problem, Behr-Manning "Abrasive Tech" engineers may have the answer. Ask for a demonstration on your toughest job in your own plant, at our main Engineering Laboratories, or at any of the 17 well-equipped "Abrasive Tech" Methods Rooms throughout the country.

For name of Behr-Manning representative nearest you, write Dept. GF-1.

BEHR-MANNING CO.
TROY, NEW YORK
A DIVISION OF NORTON COMPANY NORTON ABRASIVES®

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals
In Canada: Behr-Manning (Canada) Ltd., Brantford. For Export: Norton Behr-Manning Overseas Inc., Troy, N. Y., U.S.A.

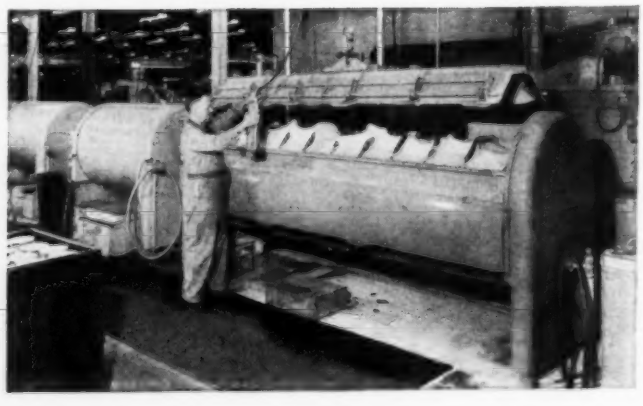
A-1

Techline tailors finishing service to fit industry needs

Old concepts of precision finishing, like the steam locomotive, are fading fast from the production scene. New ideas are replacing the old, as exemplified by Techline's **total** precision finishing service.

Techline, alone in the industry, offers equipment and supplies for **both** important processes of precision finishing — the barrel finishing and wet blasting methods. This means that Techline engineers can be completely unbiased and objective in recommending the means of solving any given problem in close-tolerance finishing. This broader scope of Techline service fills a major need of precision finishers. It puts precision parts processing on a truly scientific basis, through which results can be accurately forecast and measured.

A leading aircraft and missiles parts manufacturer (below) uses Techline barrel equipment for finishing to .0001" tolerances. A Techline-Liquamatte cabinet (top) wet-blasts marine diesel engine cylinder liners prior to chrome plating.



If you want a lower-cost method of obtaining the precise finishing results you need, call on Techline — where precision finishing is a science.

Techline shatters an industry's traditions — makes precision finishing a science.

"You asked for it" — Techline built it

You-asked-for-them features are evident in the design of all Techline equipment. Model 30, for example, is typical of Techline standard barrel finishing machines. It comes in 20 sizes having 1 to 6 compartments, from 5 to 30 cu. ft. capacity.

New ideas include the streamlined styling, "good-housekeeping" design leg supports, retractable fiberglas safety gate, safety switch, and centralized, push-button control panel. Full-opening doors make loading, unloading and cleaning operations easier. Cylinder shafts, machined **after** they are welded into position, assure positive alignment and balance, promote noiseless, vibration-free operation. For full details, write for our new Bulletin No. 200.

Techline removes mystery from media and compounds

Techline specialists have simplified your problems of selecting compounds for precision barrel finishing, with the Techline line of Chempounds. Instead of 15 or 20 formulas, Techline has developed nine standard Chemical compounds which meet the bulk of all barrel finishing needs.

Another 90 or more special formulas are available, offering particular advantages for specific finishing problems. But the nine basic Chempounds meet most requirements for deburring and radiusing, cutting down, descaling and corrosion removal, polishing and burnishing.

You save with Techline, too, because you can obtain all your media and compound needs from one convenient source, combining purchases for attractive quantity discounts and freight allowances. For full information, write for bulletin 89.

Techline
division of **WHEELABRATOR** CORPORATION

2452 Avenue V, Vicksburg, Michigan

Would your grinders have met these tolerances?

One ten-thousandths on diameter; 50 millionths total runout; 2 to 3 R. M. S. finish . . . tolerances that Peninsula Tool Co., San Carlos, Calif., *had* to hold on production runs for a well known manufacturer of ultra-sensitive tape recorders! After every grinding company on the West Coast had failed, Peninsula did it . . . because, as Peninsula Tool states, the job was put on *Rivett 1024 Grinders!*

Rivett 1024 Internal and Universal Grinder

You can keep this grinder always busy! Do any number of internal jobs and then switch over to external work. It has all the features of a true internal grinder—extra-long table moves sufficiently to left to permit plug gauging to 6" depth without retracting wheelhead slide. Both spindles are flange mounted in massive wheelhead which swivels full 180° for quick conversion! Grinds any hole to 9" dia., externally to 12" dia.

Send for catalog 1024B and learn how this famous grinder does toolroom quality on a production basis . . . switches quickly from internal to external . . . really saving time and cutting costs!

RIVETT LATHE & GRINDER, INC.
Dept. GF-1, Brighton 35, Boston, Massachusetts

RIVETT
INTERNAL & UNIVERSAL GRINDERS

3 STEPS TO THE TOP BUY...
ACTION DIAMOND WHEELS
HONES – MOUNTED POINTS
1 YOU TELL Action Diamond what you want your diamond wheel to do.
2 YOU USE the wheel Action Diamond designs and builds to do your particular job.
3 YOU GET precisely the right diamond wheel in shape, grit and bond to assure the accurate, low cost production that only a custom-built Action Diamond wheel can deliver.
JETALINE DIAMOND WHEEL
RoBot Resin DIAMOND WHEEL

Custom Built for the Job at No Extra Cost

Your custom built Action Diamond wheel has the same price tag as any diamond wheel of comparable specifications. The extra production per wheel delivered is all profit for you. Call Action in, by letter or 'phone. Show us your grinding problem. You are guaranteed an expert analysis of your diamond wheel requirements at no cost, no obligation.

At ACTION . . . The Right Wheel For Your Material

RoBot Resin DIAMOND WHEELS	• for wet or dry grinding.
Jetaline DIAMOND WHEELS	• for conventional wet grinding. • for electrolytic grinding.
Jetaline METAL BONDED ABRASIVE WHEELS	• for electrolytic grinding.

PHONE, WRITE, OR TELETYPE

ACTION DIAMOND TOOL CO.

The Pioneer of The Modern Diamond Wheel

4545 WEST GRAND AVENUE, CHICAGO 39, ILLINOIS

Telephone: CApitol 7-5321 Teletype: CG 3393

News of Metalworking . . .

American Welding Society 1959 Show

NEW YORK: Technical meetings for the American Welding Society will be held April 6-10 at the Hotel Sherman, and the Welding Show, April 7-9 at the International Amphitheatre, Chicago. Many new products will be shown for the first time. Technical papers dealing with the latest developments in welding have been requested on the following subjects: fabrication and maintenance of equipment for radioactive applications; pressure vessels, pipe lines; machinery design; structures, automation, etc. American Welding Society, 33 W. 39th St., New York 18, N.Y.

Program of MDNA Meeting

WASHINGTON, D. C.: The Guaranteed Metalworking Machinery "master inventory" plan involving a master file of machine tools throughout the country, bid bond procedures for deposits at government sales, methods of depreciation for tax purposes, association and industry public relations and public service, and government relations were among the subjects covered by members of the Machinery Dealers National Association in their annual fall meeting at Detroit, Nov. 12. •

Barden's New $2½ Million Ball Bearing Plant

DANBURY, CONN.: A $2,500,000 facility for manufacturing instrument precision ball bearings, opened by The Barden Corp., Nov. 14, stands on a 21-acre hilltop site. The aluminum and concrete building contains 125,000 sq. ft. of floor space. In addition to the manufacturing area, it contains a cafeteria, fully equipped dispensary and clinic, and other employee services.

Because of the extremely close tolerances to which the ball bearings are made, optimum cleanliness is required. All personnel working in critical areas wear lint-free garments and enter the areas through air locks or high velocity air showers. Parts and materials enter through air-locked pass-throughs in the walls. Air is filtered, electrostatically cleaned, and temperature controlled at 75°F. •

SIMONDS
ABRASIVE CO.

DOUBLE XX

Reinforced Resinoid depressed center wheels for *Fastest grinding* . . . . .

for all portable disc sanders and right angle type grinders

For grinding all kinds of steel, fabricated parts, castings, etc.—weld grinding, deburring, roughing, finishing.

CALL YOUR SIMONDS DISTRIBUTOR

Proven products
Dependable know-how
Quick supply

With lightweight, rigid-type Double XX wheels you "head" into the work at about a 30° angle . . . literally cutting metal away—a much faster method than grinding it down. Made from fast-cutting aluminum oxide abrasive, strongly bonded with synthetic resins and *doubly* reinforced for extra strength and safety. Use with mounting adaptor. No backing pad required. Available with 7″ and 9″ diameters, 3/16″ and 1/4″ thicknesses. Order from your Simonds distributor.

SIMONDS ABRASIVE COMPANY

Tacony & Frelay Sts., Philadelphia 37, Pa.

DIVISION OF SIMONDS SAW AND STEEL CO.

BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO • SHREVEPORT

"Far Superior to its Competition"...

. . . states Mr. Creighton Blanchard, toolroom superintendent at New Hampshire Ball Bearings, Inc., Peterborough, New Hampshire

THE NEW, IMPROVED THOMPSON TYPE D HAND FEED

SURFACE GRINDER

is winning enthusiastic approval wherever precision work is required

Here's what Mr. Blanchard has to say about the new Type D machine:

"We have three grinders in our toolroom—a Thompson and two competing machines. In our general toolroom grinding, especially on carbide and hard metals, we find the Thompson Type D so superior that we have recently purchased another Thompson just like it. All our precision work goes on the Thompson."

Compare these features

- Steel roller anti-friction slides eliminate ball creep and increase rigidity.
- 14" standard vertical capacity under 7" wheel at no extra cost with no loss in vertical capacity when using wet attachment.
- Solid support through entire length of bearing quill assures extra fine finish.
- 5 inch table movement per turn of handwheel improves quality of finish and speeds up operations.
- No backlash, anti-friction ball nuts and screws on cross feed prevent wheel from creeping away from work in shoulder grinding.
- Swing-out stop for table dog contact permits quick movement to wheel dresser.
- Immediate delivery available.

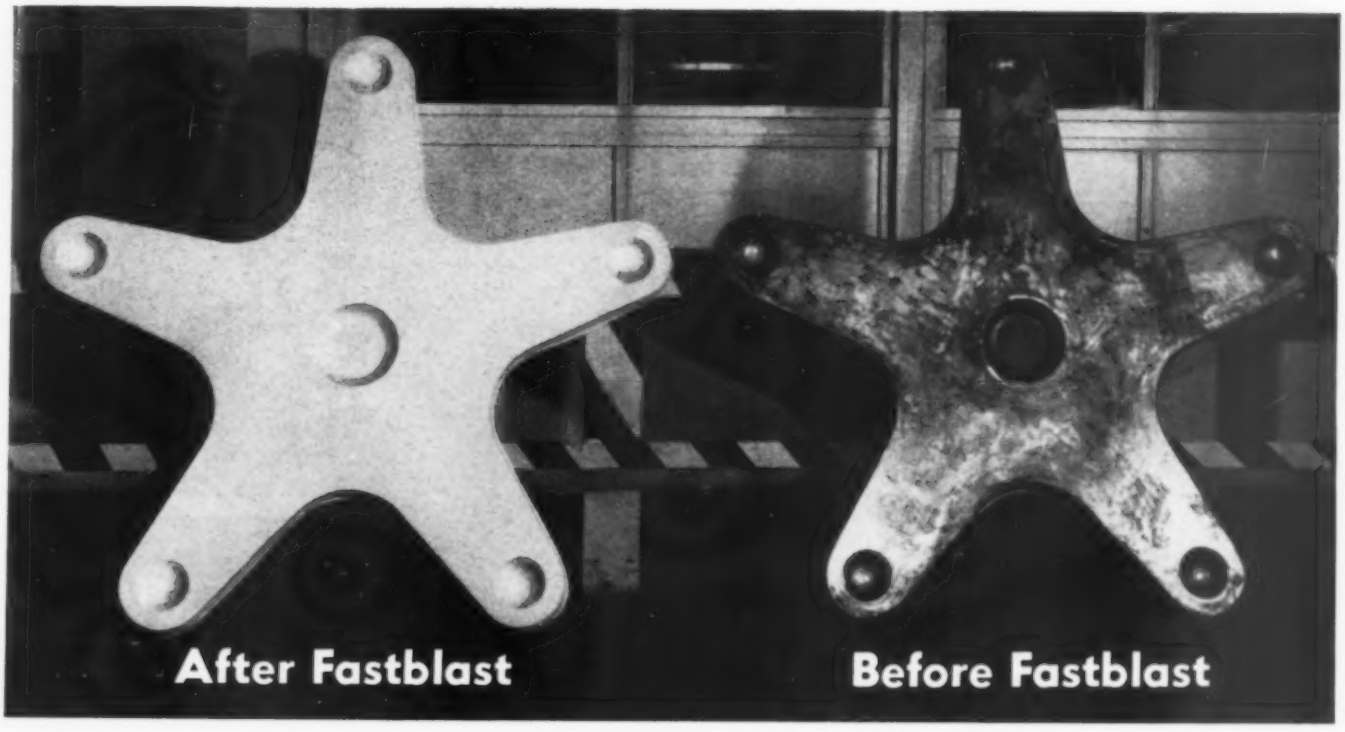
Send for descriptive literature on the new Thompson Type D Grinder.

THE THOMPSON GRINDER CO.
SPRINGFIELD, OHIO

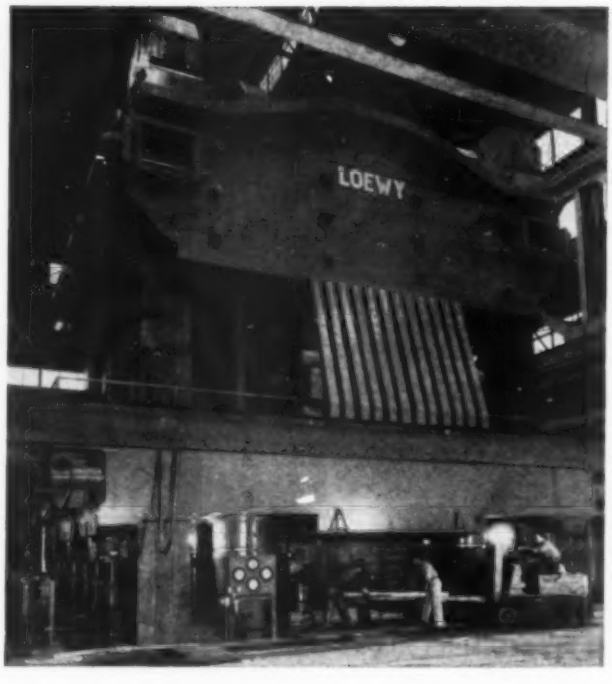
"Keep Thompson in mind for that daily grind"

Thompson SURFACE GRINDERS

Clean Forgings Fast with Exolon Fastblast

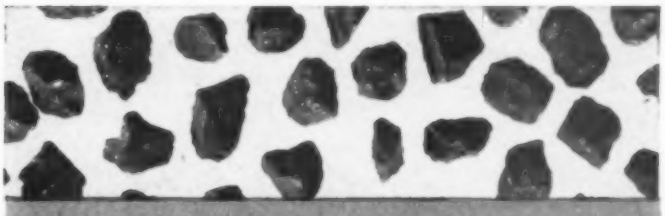


Wyman-Gordon Company cleans these Helicopter Hub Rotor Magnesium Forgings by pressure blasting with Fastblast



Above: Hub Rotor forgings were produced on this 50,000 ton hydraulic forging press at North Grafton, Mass. plant of Wyman-Gordon — U.S.A.F. It is 10 stories high, 48 feet above and more than 60 feet below the floor.

These large helicopter hubs come out of the forging dies covered with grease and graphite. Air pressure blasting with EXOLON Fastblast, a 100% new aluminum oxide abrasive, quickly cleans them. Fastblast grains are strong, sharp and clean . . . free from weak particles and "lazy" fines and splinters. It's a tough abrasive, that breaks down slowly so that its reclaim value is high. Fastblast can be used over and over again. Fastblast saves time and money. Write for complete information.



Above: Photomicrograph of Fastblast. Shows tough, hard grains that cut faster and last longer.

The EXOLON Company

1002 East Niagara Street • Tonawanda, N. Y.

Manufacturers of SILICON CARBIDE and ALUMINUM OXIDE ABRASIVES

MANHATTAN PORTABLE WHEELS

REMOVE *MORE* METAL AT LOWER COST

Fast cutting action *plus* long wheel life add up to more output per man hour . . . lower production costs with Manhattan Portable Wheels. Every specification of the wheel you use—type of abrasive, grain size, hardness, structure and bond—is determined only after a careful analysis of your grinding problems . . . the amount of metal *you* want to remove, and the finish *you* require.

Workers prefer Manhattan Portable Wheels because they get more pieces done. Management prefers them because they assure faster, more uniform quality production . . . and they last longer.

Flared cup, depressed center, cone, plug and mounted point, or straight—there's a Manhattan Portable Wheel engineered for your job requirements. Ask about the new Safety-Back Flared Cup Wheel. Let a Manhattan representative show you how to remove *more* metal, *faster* . . . get "More Use Per Dollar" . . . with Manhattan Portable Wheels and other types of high speed, heavy duty abrasive wheels.

FASTER CUTTING ACTION

LONGER WHEEL LIFE

CUSTOM-MADE FOR YOUR JOB

RM949

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

MATTISON HIGH-POWERED PRECISION

GRINDING METHODS

How to stretch belt life polishing stainless to #4 finish

Mattison's diamond-head machine design keeps belts clean and cool at Atlas Steels, Limited

More production per square inch of abrasive belt—that's one of the advantages of Mattison's four-roll head design at Atlas Steels, Limited, Welland, Ontario.

The obvious reason for long belt life is longer belts—more time between cuts for cooling. Another is that these 243-in. long belts undergo four "flexes" instead of two, giving them a better chance to "break loose."

But long belt life is not the only advantage of a four-roll head. Quality is higher, too. For one thing, the belt doesn't "wrap" on the contact roll. A flatter angle of attack permits the belt to conform more closely to the uneven surfaces of the sheet. This produces a better scratch pattern and accounts for the incomparably high finish obtained on many jobs.

Specialization is another factor. In the Mattison head, one roll aligns the belt, one drives it, and another applies the pressure. The fourth is an idler and simply increases flexing action. Separation of the contacting and driving functions means motor pulsations cannot be transferred to the finish.

These features have paid off in higher quantity and easier control of quality at Atlas. Company officials estimate that not *two sheets in a million* are lost due to machine performance. A #4 finish is consistently produced on as many as 150 tons of stainless sheets per month.

Fig. 2—Belt replacement on the 50" machine requires less than five minutes' downtime. Belts are 243" long and range from 50 grit for roughing to 120 and 150 grit for finishing. Plain rubber contact roll is 35 durometer.

Fig. 3—Simplicity of controls means the operator can concentrate on the fine points of producing a #4 finish. Cutting speed is 3600 sfpm. Stock removal averages .003 in.

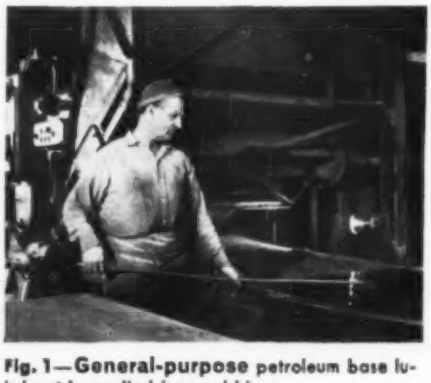


Fig. 1—General-purpose petroleum base lubricant is applied by swabbing.

Less than 2% downtime

Two Mattison No. 455 abrasive belt grinding and polishing machines are frequently used on 24-hour production schedules and yet have recorded less than 2% downtime since 1952. In the words of one Atlas official: "Performance has been failure-free with downtime restricted to scheduled maintenance once or twice a year."

MATTISON MACHINE WORKS
Rockford, Illinois Phone 2-5521

Want More Information?

Write for free literature describing the Mattison No. 455 Reciprocating Table Sheet Polisher or No. 456 Pinch Roll Grinder for single-pass work.

MATTISON MACHINE WORKS

HIGH-POWERED PRECISION SURFACE GRINDERS

HERE IS THE GRINDER YOU ASKED FOR!

● A smaller (14" x 42" or 14" x 48" table) heavy duty, high precision surface grinder with controls at eye level retaining all the features that have made HILL horizontal spindle hydraulic surface grinders famous for precision production during the past twenty years. This is an entirely NEW grinder brought out at your request to compliment the line of HILL heavy duty surface grinders of larger sizes. Where initial cost and limited floor space are critical factors we believe that this new, smaller HILL grinder will solve your finer finishing problems. Full details are given in bulletin 58GS.

HILL Horizontal Spindle grinder with fully hydraulic table and cross feeds. Size: 14" x 42" table with 16" clearance. Magnetic chuck is standard equipment.

Of course we still make the full line of HILL horizontal spindle and vertical spindle grinders in the larger sizes with table lengths from 5 to 20 feet.

THE HILL ACME COMPANY

1207 W. 65th STREET
CLEVELAND 2, OHIO

HILL-ACME TOOLS FOR INDUSTRY

Manufacturers of: "HILL" Grinding & Polishing Machines — Hydraulic Surface Grinders — "ACME" Forging — Threading — Tapping Machines — "CANTON" Alligator Shears — Billet Shears — "CLEVELAND" Knives — Shear Blades

... wherever abrasive operations are performed

EDITOR'S PAGE

How the Grinding and Finishing Industry Serves You.

New Year is the traditional time of the year for looking back and looking ahead. In order to present the broadest view of the past and future of our industry, GRINDING AND FINISHING has approached many of the leaders within the industry.

Their remarks and an evaluation of these remarks follow in the article entitled "A Special Report on the State of the Industry."

Besides being timely there is another reason for our presentation of such an article. GRINDING AND FINISHING was conceived because of the need for this large segment of the metalworking field to be heard. There is little doubt as to the importance of the abrasive operations to many phases of production, but there are also many areas in which abrasive operations have not been used because of the lack of understanding. We here at GRINDING AND FINISHING have often asked the question, "Why not grind it?" Many of the times we have received one of these two answers: "We have the mill" (or whatever machine they are using) and so we use it" and "This is the way we have always done it."

Abrasive operations aside from finishing applications are of more recent origin than most metalworking operations. We do not feel this is a good enough reason for a manufacturer to handicap himself. Any stock removal operation can be performed by an abrasive operation. Obviously, there are situations when the abrasive operation is not as practical. Each method will be superior in a particular area, but abrasive operations are not being considered in all situations in which they are advantageous. There are too many instances of companies "hanging on to" old machines that should be replaced by abrasive machines. If all operations performed on many of the machines now in use were evaluated, many of these machines would be replaced by abrasive machines. It would pay many companies, in a short time, to replace the old machines with abrasive machines even though a few of the operations would not be ordinarily considered for the abrasive machines. Abrasive operation should be considered whenever stock is to be removed.

Precision and finish obtained by abrasive operations needs little comment. In these two areas grinding and finishing operations are far superior to any other method of machining.

The State of the Industry article we are presenting in this issue points out the developments of last year and those you can expect next year, but it should be remembered that the developments which have brought this industry to its present position, are still not used to full advantage. These developments are only on the verge of making their impact on the metalworking field.

M. M. Patterson

MANAGING EDITOR

JANUARY, 1959

An Exclusive

GRINDING and FINISHING Report...

THE STATE OF THE INDUSTRY 1958-1959

What's happening in abrasives, grinding machines and equipment? Top executives in the industry comment on last year's big developments, next year's sales and technical progress outlook.

By the Editors of GRINDING and FINISHING

● The turn of the year is always a time for stock-taking. It is a time for reviewing the accomplishments of the previous year, for looking ahead to the coming year. In the field covered by GRINDING and FINISHING, for instance, 1958 saw the introduction of the first new synthetic abrasive in many years and the achievement of tolerances for missile and jet-engine applications that have come near to plus-or-minus zero. On the other end of the scale, improved abrasives and machines have made possible a higher rate of stock removal on snagging and other operations. The long-range development of safer and more productive wheels continued its steady progress. Technical progress has been spurred by lagging sales.

1959 gives promise of some major break-throughs as well. This could be the year when a couple of other new abrasives bridge the cost-production gap that has been holding them up, and become available for general uses. There are indications that ways will be found to utilize in production still higher wheel speeds than have hitherto been regarded as feasible. Safety will be stressed as the use of reinforced wheels is expanded. The frontiers of stock removal will be expanded, and tolerances, on the other, as one executive put it, will ". . . approach the vanishing point." There will be bigger, more automatic grinding machines for still higher production, and conversely, economy models that will bring to the toolroom and the medium-to-small shop features that only a short time ago could be found only on the most advanced and most expensive machines. The grinding of advanced, jet-age materials will be improved, to make routine production operations of applications that are now considered highly specialized. Still further inroads will be made into areas once considered as monopolies of single-point cutting tools.

Saleswise, 1959 should be better than 1958, with predictions ranging all the way from unspecified amounts of increase up to a virtual doubling of '58 sales, and a strong indication that 1959 may equal 1957.

All of this is not something out of the crystal ball, but the considered opinions of top executives from the major machine and equipment builders and abrasive manufacturers, as well as from a number of the smaller, more specialized firms. These men were contacted by the editors of GRINDING and FINISHING in order to bring together for our readers a summary of the highlights of 1958 and an informed forecast as to what 1959 may bring forth.

1958—Year of Man-Made Diamonds

The introduction of man-made diamonds in production quantities was by all accounts the big development of 1958. First announced in late 1957, synthetic diamonds became commercially available

L. A. Patt

E. L. Auker

L. S. Hilton

John Jeppson

last spring. In the sizes in which they can be manufactured, they have shown superiority over natural diamonds in productiveness. It may well be that in years to come 1958 will be known as the year when man-made diamonds were introduced.

For instance, according to Leon A. Pratt, Vice President, Carborundum Co., "The most significant development in abrasive applications during 1958 was the commercial release of man-made diamond grinding wheels. The research and development work which was carried on during the previous two years in both the manufacture and application of man-made diamond grinding wheels made possible the phenomenal success and acceptance of these wheels immediately upon their release. This development is truly one of the great milestones in the history of grinding."

E. L. Auker, Vice President, Bay State Abrasive Products Co., stated, "One of the most significant developments within the abrasive industry during 1958 was the advent of man-made diamonds and their utilization in grinding wheels. The high cost of the diamonds at first prohibited widespread usage. However, with greater production the cost has been lowered, and no doubt will continue to be lowered still further in the future. In many applications, the wheel cutting rate and wheel life has shown marked improvements over wheels manufactured with natural diamonds."

Lamar S. Hilton, Sales Manager, Abrasive Wheel Department, Raybestos-Manhattan, Inc., says, "We feel that the announcement and availability of man-made diamonds has been the outstanding development in the abrasive field in 1958."

John Jeppson, Vice President & General Manager, Abrasive Division, Norton Co., said, "The most significant development in abrasive application during 1958 was the introduction of man-made diamonds."

But the introduction of man-made diamonds was by no means the only outstanding development of 1958. Many other advances were almost as important, over-all, but perhaps not so striking only because they represented further inroads into already established areas. The previously-noted advances in precision; higher production through automation; improvements in machines that will give faster and less expensive operations without increases in cost of new equipment; new products and applications of abrasives; and greater safety resulting from wider use of reinforced and safety back wheels are all areas in which substantial progress was made.

Precision

Precision has always been a hallmark of abrasive operations. We find that the industry is not resting on its laurels. The advent of supersonic aircraft, missiles and rockets plus the increased demands for precision in the manufacture of more mundane products such as automobiles, refrigerators, etc., has demanded advancement toward more precise machines.

Carl Schonhoft, Manager, Grinding Machine Sales, Cincinnati Milling Machine Co., covers this point very well by saying, "Performance of today's precision grinding machines must be far more exacting than the best of a few years ago. Accuracy requirements in the servo-mechanism and missile fields, for example, are approaching the vanishing point. These tolerances, which may be as small as 10 millionths for roundness and 25 millionths for size and straightness, must be obtained on the grinding machines, and at a realistic cost . . . 'Match-grinding' will be the final solution for some types of work."

Still further evidence of the advances in precision can be found in a statement by L. R. Rothenberger, Vice President, DoAll Company, "As a finishing machine the grinder took on new importance in 1958 because of the continued demand for closer tolerances and finer finishes. More work is going to the grinder today than ever before."

Wallace B. Bainton, Vice President, Brown & Sharpe Mfg. Co., adds, "The most significant development in the abrasive field during 1958 was sizing which permits an unskilled operator to grind to the fifth decimal place."

And as H. I. Sole, Manager of Sales, Lapmaster Division, Crane Packing Co., put it, "The most significant factor in surface finishing by the abrasive method during the past year has been in the accelerated guided missile field, however, we cannot

Carl Schonhoft

L. R. Rothenberger

W. B. Bainton

H. I. Sole

THE STATE OF THE INDUSTRY 1958-1959

(continued)

overlook the jet engine aircraft program which has also grown by leaps and bounds. These are the major advanced industries at the moment which require constant betterment in regards to surface finish and flatness."

Automation

1958 saw the continuation of increased automation throughout the metalworking field. Many machines now, however, are being designed for the addition of automatic features as they are needed. The ability to add features has greatly enhanced many operations.

Such a situation was described by J. E. Storm, Vice President and General Sales Manager, Van Norman Machine Co., "In the field of centerless and center type cylindrical grinding, we believe the introduction of crush dressing with a centerless grinder has been the outstanding achievement in this field. With this method we have shown that ten times the number of parts can be obtained without retruing the wheel when compared to diamond dressing. Stock removal is more rapid, thus increasing production per hour."

Another example of increased automation is the replacement of manual control by power. The ultimate of this situation is tracer-control. Alan C. Mattison, President of Mattison Machine Works, brought out both these points when he mentioned, "The inherent economy of removing metal with a 'self-sharpening' tool such as a grinding wheel has this year been consolidated by the development of a power-tilting spindle for rotary surface grinders. All of the other requirements—improved wheel bonds, higher horsepower spindle motors, high rigidity in the machine, and continuous downfeed—are embodied in machines which today challenge other methods of removing stock from flat piece parts.

"The perfection of a tracer-controlled horizontal spindle surface grinder for finishing to extremely close tolerances and fine finish opens up interesting new opportunities in form grinding. These are standard machines with hydraulically actuated controls for moving the spindle, gaging off of templates."

Snagging operations are probably one of the best examples of "chicken and egg" developments in the grinding and finishing field. The basic requirement for snagging is to remove as much metal as possible in the shortest time with the greatest economy. As the abrasive manufacturer produced an abrasive which would run faster safely and cut at a more rapid rate, the machine builders have built machines with greater power and more automation.

As Carl F. Leitten, President of Electro Refractories states, "We feel that many significant applications were made during 1958, among which are the expanded use of automatic grinding machines for stainless steel billets, the improvement in the manufacture of grinding wheels for such machines, many new uses and applications for reinforced wheels and, of course, we are all familiar with the improvements that are continually being made in grinding equipment which enable the operator to work with greater ease and precision and at the same time grind much more economically."

Machines

The development of abrasives and machines in the field of grinding and finishing has often been a case of the "chicken and the egg" in that many improvements of the machines depend upon abrasive developments and vice versa. 1958 was a year of development for both.

An example of the dependency of the two is this statement by Benjamin R. McConnell, Sr., of Sunnen Products Co.: "The more compact design of valve blocks brought up some problems with blind or shouldered holes of short length and increased the demand for what is termed 'hard-tipped' stones."

Still another example is the comment that F. G. Shockey, Division Manager, Hill Acme Co. made: "Our greatest increase in inquiry activity since the

first of 1958 was from food processing equipment manufacturers who are calling for finer and finer finishes on stainless steel products. Naturally, this is not a function of the machine, but is merely a development that can be accomplished on any of the abrasive belt machines by using finer grit abrasive belts."

New Products and Applications

Significant new applications have been found in coated abrasive use and the grinding of new materials such as titanium, zirconium, etc. Here again the recent rapid development of missiles and aircraft have pushed the uses and developments of abrasive operation. These applications, although confined for the most part to these industries, will benefit other fields in the near future.

In the field of coated abrasives, W. S. Hoskin, General Sales Manager, Michigan Abrasive Co., said, "It is interesting to note the gradual acceptance and use of resin bonded products. More resin items have been made available to those users who are aware of their superiority for many applications, even though cost is higher."

C. C. March, Vice President, Coated Abrasives Division, Minnesota Mining & Manufacturing Company, puts it this way: "New aircraft and missiles requirements have given the abrasive industry as a whole one of the most severe challenges in its history. High temperature alloys for this field present new problems in grinding and finishing. More exacting specifications in contour and finish are putting heavier burdens on abrasive quality control. The net effect has been to stimulate research to an extent never before approached in coated abrasive manufacture."

According to J. F. Claydon, General Manager of The Carborundum Company's Coated Abrasives Division: "From an application viewpoint, the expansion of roll grinding techniques via coated abrasive usage is of considerable significance. Savings in time and total costs have paid for machine installations in as short a period as one regrinding operation."

Dick Olton, Manager Product Engineering, Behr-Manning, adds, "The current year has seen abrasive belt grinding become a standard practice among titanium fabricators. It has also witnessed the development of techniques for successful grinding of zirconium and its alloys."

And from S. H. Miller, Grinding and Polishing Machinery Manager, Hammond Machinery Builders, Inc.: "In the past year or so we have seen a very definite trend toward abrasive belts for flat finishing operations."

Advancement in new material in the abrasive grain field has also brought comments about the past year. From Joseph S. Imirie, Vice President of Carborundum: "There are two areas where gains have been made. The first is the introduction of fused zirconium oxide grains for use in grinding wheel manufacture. The second is a great deal of aggressiveness in making much improved abrasive media available to the growing use of barrel finishing techniques."

From R. P. Harty, Vice President of Exolon Co.: "The use of fused aluminum oxide in barrel finishing has certainly increased and should continue to do so . . . High purity fused aluminum oxide is also finding increased usage in the manufacture of grinding wheels for surface grinding and other tool room applications."

A new product which has recently made itself felt in the industry is the flap-type wheel or roll.

A. Block, General Manager of Merit Products, Inc., pointed this out by saying, "The use of flap-type wheels as a single unit in widths up to 60" mounted in a complete machine designed to handle panel stock, is the most outstanding development in the field of coated abrasives."

Paul B. Brown, President, Peninsular Grinding Wheel Division, believes that the most significant improvement has been ". . . the relative improvement in the efficiency of high speed snagging wheels. These product improvements have been a continuing thing

J. E. Storm

A. C. Mattison

C. F. Leitten

G. W. Balz

B. R. McConnell, Sr.

W. S. Hoskin

THE STATE OF THE INDUSTRY 1958-1959

(continued)

over the past several years, but I believe this last year, under existing economic conditions, have been somewhat more pronounced."

In another area, C. R. Stroupe, Vice President of Anocut Engineering Company, had this to say: "During the past year, extensive research and development has been devoted to electrolytic grinding wheels by many companies, large and small, in the abrasives industry. Perhaps the most important advance has been the development of a non-diamond wheel which can be satisfactorily shaped by a conventional single-point diamond dressing tool."

And G. W. Balz, President of Roto-Finish Company, comments on advances in barrel finishing: "I feel that the most significant development in barrel finishing during 1958 has been the use of conventional aluminum oxide media and new high efficiency compounds to produce dimensionally controlled finishes on high grade alloy steel parts such as roller bearings. These finishes are as low as 2 RMS with a very high lustre and allow dimensional control in the millionths of an inch. Such finishes in the past required extremely complex methods of utilizing many different forms of media and required as much as 75 hours process time . . . A new method produces these finishes with one type of chip in as little as eight hours."

Safety

At first thought safety does not seem to be field in which developments would often occur. Actually, the grinding and finishing industry has been very active in promoting developments of this type. In fact, many improvements in our industry are the result of first developing the safety aspect of the product. Mr. Auker established this point when he said, "Advancement in the manufacture of reinforced resinoid products, from a safety point of view, is also a significant abrasive development during the last year."

Mr. Jeppson mentioned that an important development during 1958 was ". . . increased and more diversified application of reinforced wheels."

The Sales Picture

There is no doubt that 1958 sales were down. In fact, down to a point where the editors were reluctant to ask for comments. One comment on this subject, however, from Joseph S. Imirie, Vice President of The Carborundum Company and General Manager of the Electro Minerals (abrasive grain) Division, is worth quoting: "Happily, our business has been improving in noticeable increments since midsummer—we hope that we are a forerunner of tidings of a good nature in this contrary circumstance . . . We do not rule out the very real prospect of the fourth quarter 1958 plus the first quarter 1959 resembling the same period of 1954 and 1955."

There is likewise no doubt, in the minds of the executives participating in this survey, that 1959 sales will be up.

In this respect one point needs to be noted. Purchases of grinding machines, for the most part, are capital investments, as are purchases of some of the accessory equipment. In the over-all picture, these might well follow a cycle of their own, rather than varying with general economic trends. Purchases of the abrasives themselves, on the other hand, would for the most part be considered operating expenses, with total sales more responsive to the general business level, and probably more closely tied to steel and automobile production.

The predictions of 1959 business were uniformly optimistic, with estimates of the percentage of increase grouped around 20%. " . . .equaling 1957 . . ." was a phrase which kept recurring in the responses, and as one company put it, "1957 was the largest year in our history."

Manufacturers of grinding wheels see a somewhat brighter outlook than other manufacturers of abrasives, anticipating perhaps a 25% increase for next year, with individual estimates varying from 15-20% up to 40%. Predictions for both coated abrasives and grain, however, were quite closely grouped about 20%.

A much wider variation showed up in the responses of machine and equipment manufacturers, though here again the most frequently mentioned increase was 20%. Individual estimates varied from an unspecified amount of increase up to the 75-100% increase over 1958 business which was mentioned above.

The expected improvement in general business, of course, was frequently mentioned as a reason for better sales in 1959, though it has been indicated (see "Predicting Abrasive Production from Steel, Auto Forecasts," GRINDING and FINISHING, December, 1958) that there is little correlation, for instance, between Gross National Product and the production of either aluminum oxide or silicon carbide, the two basic manufactured abrasives. For abrasives, the replacement of inventories that have been allowed to deteriorate during the slack buying period of 1958 may cause 1959 purchases to exceed consumption. For grinding machines and accessories, of course, the rate of replacement of obsolete equipment and the acceptance of improved machines will tell the tale. Much of the basis for the optimism of the abrasive manufacturers lies in the sales possibilities resulting from new applications. Individually, some of these—mechanical descaling, for instance—represent large-volume markets; collectively, they may well comprise a substantial addition to the available business.

In the words of E. P. Gillane, President of Pratt & Whitney, however, "To get our share of this big increase in sales, we must be ready to produce with greater efficiency in an intensely competitive market. This demands the latest in machine tools and other manufacturing equipment . . ."

1959—Greater Precision—Higher Speeds—Safety

The new year seems likely to be an outstanding year for the grinding and finishing industry. Many developments are indicated as the result of research prompted by slow business conditions of 1958. One of the more important points to look for in 1959 may be the marketing of machines incorporating the accuracy required by the missile and aircraft fields into smaller machines at lower prices. Still other developments appear to be coming in the areas of: larger machines, increased automation, higher speeds, better bonding, new grains, improved hot pressed wheels, new contact wheels, mechanical descaling and new applications.

Precision

Grinding and finishing operations, as we have mentioned before, have no peer in the area of precision. The industry has been able to answer almost every request for increased accuracy. The following are quotable comments:

H. I. Sole, Lapmaster Division, Crane Packing Co.: "We feel that one of the major developments in our line of business in the forthcoming year will be to produce even finer finishes and possibly greater degrees of flatness as applied to the missile and aircraft industries.

"This, of course, also carries into our present day reciprocating engine building as well as the automotive industry where horsepower is increasing and coupled with other factors, demand metal to metal joints eliminating previously gasketed surfaces."

Mr. McConnell, of Sunnen: "Just as the recent years have been a period of constant research and development, and resulting progress in the honing division of the abrasive industry, it looks to us that we cannot afford to rest on any laurels because the continuing trend towards greater precision brings the promise of an even greater challenge. And in this nuclear and space age we cannot afford to be

C. C. March

J. F. Claydon

Dirck Olton

J. S. Imirie

R. P. Harty

P. B. Brown

THE STATE OF THE INDUSTRY 1958-1959

(continued)

bound by traditional thinking, no matter how recent the developments on which such concepts might be founded. Only one thing is certain: Change to insure continual progress."

As has been said before, machines and abrasives develop for each other. Still another example of this, along the lines of precision, is this statement by D. S. Connor, President and General Manager, Micromatic Hone Corporation: "If all research and development work now being done in trying to establish a method of checking stones and assuring consistency was successful, these would be some really outstanding developments in 1959, but we cannot predict the results of this work now."

Wallace B. Bainton, of Brown & Sharpe Mfg. Co.: "I believe one of the outstanding developments in 1959 could be a broader use of the principles of our new sizing in other than the missile field, such as the applications to tool room grinding, etc."

E. L. Auker, Bay State Abrasive Products Co.: "The outstanding developments in the abrasive industry in 1959 could be the further development and advancement in manufacture of abrasive products which will more precisely grind and finish bores of miniature bearings, cut previous materials within closer limits, more general and more accurate use of abrasives products in honing and superfinishing operations, the manufacture of finer grit vitrified wheels that will produce more precise finishes and closer dimensional limitations."

J. F. Claydon, Coated Abrasive Division, Carborundum Co.: "Expected developments of significance in 1959, we think, lie again possibly along the line of refinements or new designs in contact wheels plus many new applications in the precision field."

Machines

Developments of machines will continue to be basically on greater precision and automation. But developments are also indicated in increasing the horsepower, size and speeds. J. E. Storm of Van Norman illustrated these points by saying, "The major development in 1959 will be concentrating on our centerless grinder line in producing larger models than now are available and also incorporating the crush dressing method. We will also concentrate on high production parts for various companies and are developing new loading and unloading fixtures which will be tied in with automatic gaging and size compensation."

In regard to increased speed, H. Harig of Harig Mfg. Corp., comments, "Improvement of spindles to allow greater speeds in I.D. grinding will be the outstanding development of 1959."

F. G. Shockey of Hill Acme Co. substantiates the trend toward larger machines, "We believe from very recent work that we have been doing that the outstanding developments will be in large machines for the aircraft industry—for processing stainless steel as well as other high temperature alloy material to be used in the new bombers which are to be produced within the next year or two. Some of these machines will be as much as 120" or 130" wide."

G. W. Balz of Roto-Finish Co. notes, . . . "developments in the design and use of abrasive slurry machines which allow completely automatic deburring of complex precision parts in as little as five seconds.

"1959 will probably see the marketing of reliable vibrating type deburring machines which allow greatly reduced deburring cycles. Current problems are mainly mechanical, although lining preservation is also a major problem."

New Products and Applications

In 1959 the new alloys will still be new applications for some of the abrasive operations. There also appears to be evidence that grinding and finishing operations will invade areas of machining which up until now had not been considered.

Dirck Olton, Behr-Manning Co., stated, "Major developments anticipated for 1959 are significant indeed, in the sense that they open sizable markets. The first is mechanical descaling, now undergoing testing in several steel mills.

"Second large-scale potential which 1959 may open up is the continuous automatic belt grinding of welds or welded steel rails which are increasingly popular on American railroads."

Alan C. Mattison, Mattison Machine Works, said, "Other developments have been in the area of abrasive-belt grinding on super alloys, small parts, and non-metallic materials. Future advances in these areas look promising."

C. C. March, Minnesota Mining & Mfg. Co., said, "For 1959 we foresee developments pending which will expand the use—and usefulness—of coated abrasives in new markets, as well as in some of the 'corners' of established markets, and make them even more competitive with other methods of abrasion."

New Materials

There are some new bonding and abrasive materials in the laboratories which could well have the same effect on the grinding and finishing industry in 1959 that synthetic diamonds had in 1958.

To support our opinions, S. H. Miller, Hammond Machinery Builders, said, "We feel that the increasing use of abrasive belts will depend on the progress machine tool builders and manufacturers of abrasives make in their products. We, for example, are experimenting constantly with new applications for abrasive belts and we know the abrasive belt manufacturers are constantly working on ways and means to improve their belts including better bonding, which is an important factor."

Carl S. Leitten of Electro Refractories & Abrasives Corporation, comments, "We feel that new abrasives such as fused zirconium oxide may begin to find their place in industry."

Improvements are also indicated in wheels, particularly reinforced resinoid bond wheels. There are indications that *safe* wheel speeds and pressures can be increased sometime in 1959. The results of these increases will be increased cutting action and, of course, savings to the user. As Paul B. Brown, President of Peninsular Grinding Wheel Division, puts it: "If I were to predict any one particular technical improvement or new development in 1959, it would be a further exploitation of the efficiency of higher speeds in the grinding wheel industry.

"It has long been known that higher speeds than those currently recommended by the grinding wheel industry, through their safety code, produce a greater efficiency, particularly in heavy grinding operations. It is almost a certainty that some grinding wheel manufacturers, under controlled conditions and on suitably built equipment, will offer grinding wheel users their products with the consequent efficiencies."

And finally, from John Jeppson, Norton Co., "We expect developments in the industry during 1959 to be improved billet grinding techniques involving higher pressures, higher speeds and greater horsepower."

Safety

Safety is a continuing phase of development in the grinding and finishing industry. The importance of this phase to the industry cannot be overlooked. Lamar S. Hilton, Raybestos-Manhattan, Inc., said, "Safety in grinding will be stressed in 1959 as most users are demanding reinforced wheels and safety back flared cups."

L. A. Patt, Carborundum Co., said, "The two areas that will receive considerable attention during 1959 are: (1) The much needed standardization in the grinding wheel industry will make considerable progress. (2) There will be considerably more stress placed on the subject of safety in the use of grinding wheels."

Mr. Patt also provided us with the statement we feel best sums up the direction of the industry as a whole. "Although we will have several new lines of abrasive wheels ready for release during 1959, we feel that the growth of new grinding applications will probably be more outstanding from an over-all industry point of view. These new applications will be in the form of eliminating prior machining operations." • • •

E. P. Gillane

D. S. Connor

Herbert Harig

Residual Stresses Produced by UP Grinding and DOWN Grinding

- ✓ *In surface grinding, the degree of stress in the ground surface produced by conventional crossfeeding is the same as that produced by crossfeeding at only one end.*
- ✓ *Performance characteristics of the wheel are changed by the method of crossfeeding.*
- ✓ *Whatever method will produce the most satisfactory end product can be used without changing the residual stress in that product.*

By **John A. Mueller***

Residual stresses in ground surfaces have been the subject of an intensive research program carried on over the past ten years by the Grinding Wheel Institute at the Mellon Institute of Industrial Research. A suitable technique of stress analysis was developed by Dr. H. R. Letner[1,2,3] which enabled a meaningful and authoritative study to be made of these stresses.

A knowledge of the residual stresses that exist in any processed part is important because these stresses may contribute to early failure due to fatigue or they may actually improve the fatigue life of the part. Residual stresses may result from such operations as heat treatment, machining, peening, tumbling and grinding. These stresses manifest themselves on the ground part by producing distortion or warpage and sometimes even by cracking.

This ten year program was highlighted recently when the Grinding Wheel Institute in a tripartite study made at Battelle Memorial Institute determined the effect of grinding conditions and resultant residual stresses on the fatigue strength of hardened steel. A paper outlining the work of this study by Tarasov, Hyler, and Letner[4] showed that—

(1) Good grinding practices did not lower the fatigue limit of the part.

(2) Severe grinding practices caused a drop in the fatigue limit but much less than the magnitude of the stresses would indicate.

To supplement these data and to show how they can be applied to everyday shop practice, additional information was compiled to show the stresses produced by UP grinding versus DOWN grinding.

Figure 1 clearly defines each type of grinding so that the terminology may not be confused. DOWN grinding means simply that the work is moving in the same direction as the wheel while in UP grinding the wheel moves in the opposite direction to the work.

Figure 2 shows the results of grinding tests that were run on high carbon, high chromium steel hardened to Rc 62. The data clearly show a well defined and substantial difference in wheel performance produced when UP grinding is compared to DOWN grinding.

The grinding ratio, which is the metal removed divided by the wheel loss, is much higher when UP grinding than when DOWN grinding. This means the wheel did not break down as rapidly as when it was DOWN grinding. Burn on the metal is the same on both kinds of grinding. The glaze on the wheel, however, adds to the story. UP grinding generated a definite glaze on the wheel while DOWN grinding shows a very slight glaze.

DOWN grinding consumed more power despite the fact that the wheel broke down more rapidly

*Member of the Research Technical Subcommittee of the Grinding Wheel Institute and Abrasive Grain Association and Manager, Grinding Laboratory, Bonded Abrasives Division, The Carborundum Company. This article is based upon research sponsored by the organizations at the Mellon Institute of Industrial Research.

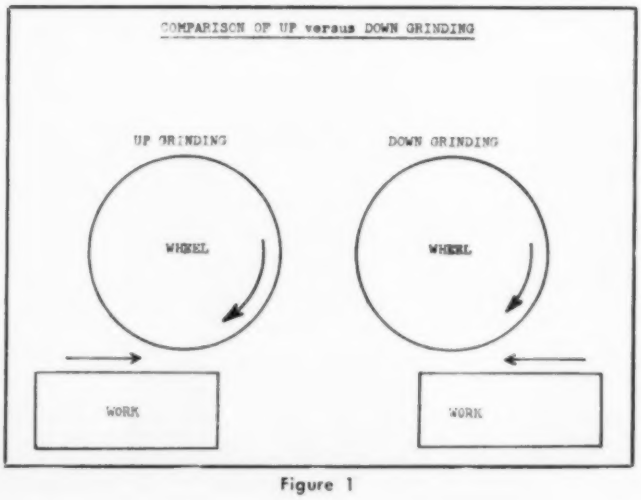


Figure 1

MACHINE:	HORIZONTAL SPINDLE SURFACE GRINDER
WHEEL SIZE:	8" x 1/2" x 1-1/4"
WHEEL SPECIFICATION:	
GRAIN	Aluminum Oxide
GRIT	46
GRADE	I
BOND	Vitrified
WHEEL SPEED:	6000 SFPM
MATERIAL GROUND:	2 pieces HYCC High Carbon - High Chromium Die Steel Hardened to Rc62 - Area 32 square inches.
GRINDING FLUID:	None-Dry Grinding
CROSSFEED:	.030"
TABLE SPEED:	35 FPM
INFEED:	.005"

TYPE OF GRINDING	METAL REMOVED GRAMS	METAL REMOVED INCHES	WHEEL LOSS GRAMS	GRINDING RATIO	FINISH M.I. RMS	BURN	GLAZE
UP	20.34	.0052	.37	55.0	6	NO	Definite
DOWN	19.24	.0050	.47	40.9	7	NO	Very Slight

Data compiled in the Grinding Laboratory of the CARBORUNDUM COMPANY

Figure 2

and the finish produced was the same as that with UP grinding. This indicates more free-cutting condition when UP grinding.

All these factors indicate that there should be a difference in the amount of stress generated in the ground surface. However, additional tests were run on 52100 type bearing steel hardened to Rc 59 and the stresses were measured according to the technique developed by Letner. It is known as the deflection method and makes use of the principle that stresses at or near the surface of a flat piece of metal will produce curvature in that metal until an equilibrium in stress distribution is reached. The details of the specimen preparation are contained in the transactions of the ASME[3] when the original work was reported.

The conditions under which 52100 specimens were ground are as follows:—

Wheel Size — 8" x ¾" x 1¼"
Wheel Specifications
Grain — White Friable Aluminum Oxi
Grit — 46
Grade — I
Bond — Vitrified
Wheel Speed — 6000 SFPM
Table Speed — 60 - 65 FPM
Crossfeed — .050"
Unit Downfeed — .001"
Grinding Fluid— Soluble oil 50 to 1 water solu

Figure 3 shows the stress produced in the ground part. The top surface was ground by the UP grind-

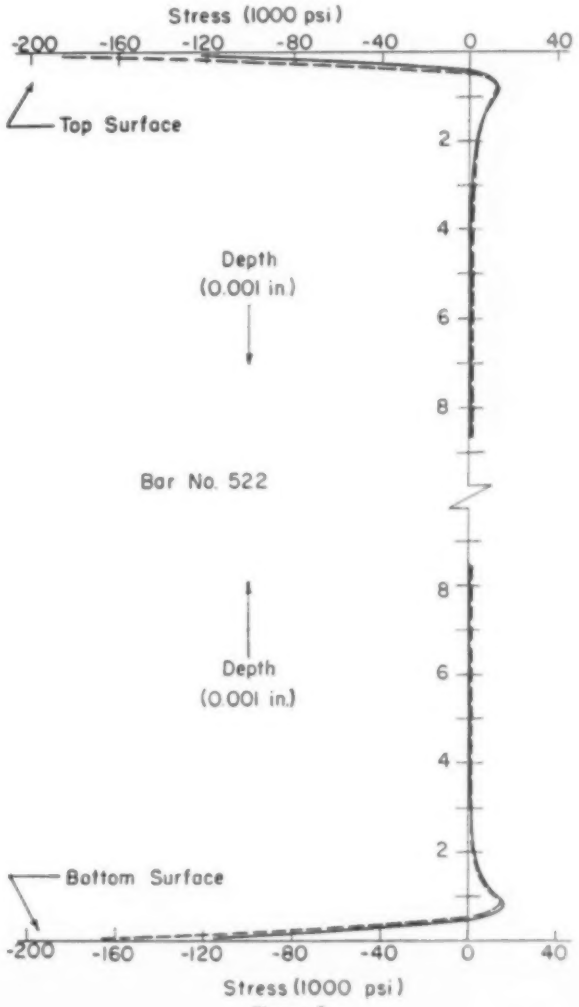


Figure 3

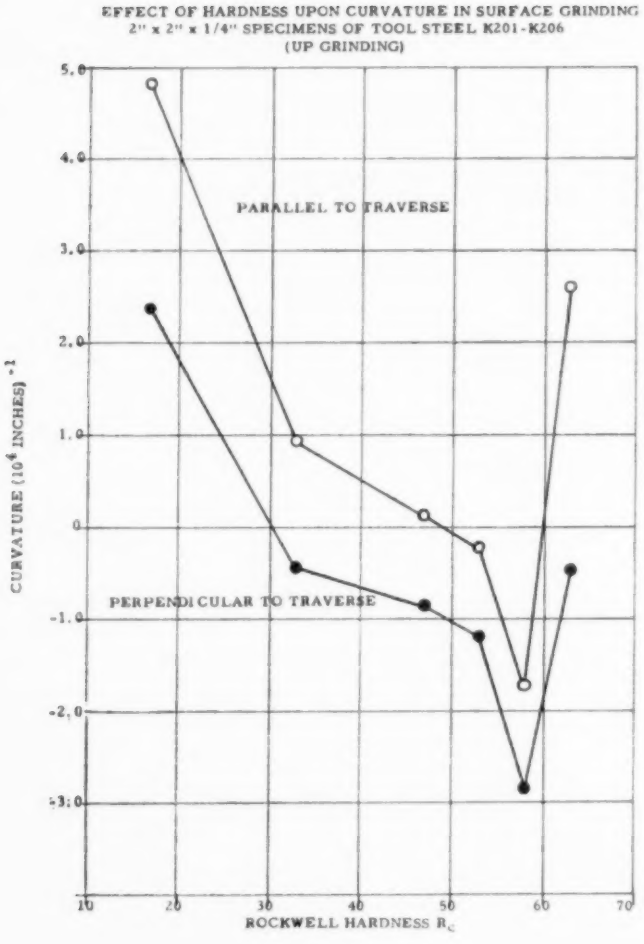


Figure 4

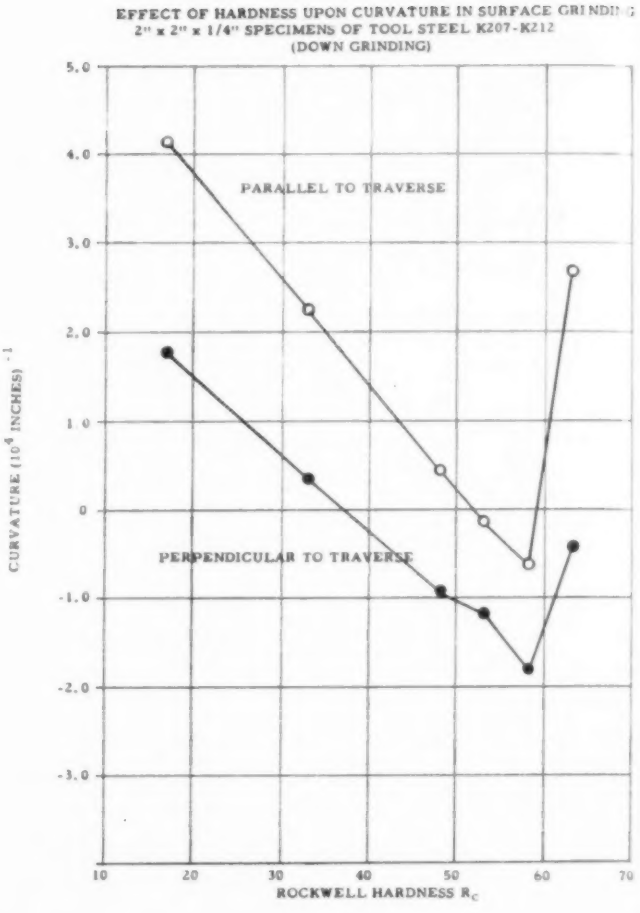


Figure 5

ing method and the bottom surface was ground by the DOWN grinding method.

Figure 3 is a typical stress curve. Minus values indicate compressive stress and plus values indicate tensile stress. The solid line is the stress parallel to the direction of abrasive travel and the dotted line is stress perpendicular to the direction of abrasive travel.

It is apparent that there are no significant differences between the stresses induced by the two types of grinding.

Additional tests were run on 2" x 2" x ¼" Tool Steel specimens whose hardness ranged from Rc 63 to Rc 17. The conditions of grind were similar to those used on the 52100 steel except that dry grinding was used instead of a grinding fluid. Curvature measurements were made and Figures 4 and 5 show these measurements.

It is apparent from these curves that there is no appreciable difference in the curvatures resulting from UP grinding and DOWN grinding.

These curvature measurements substantiate the conclusions produced by the stress measurements and add credibility to the conclusions.

Power consumed in these tool steel tests were as follows:

UP GRINDING .....0.12 KW
DOWN GRINDING ..0.26 KW

These figures produced by independent experimenters at different times corroborate each other and again add substance to the data.

Incidental to the comparison of UP grinding versus DOWN grinding Figures 4 and 5 show that; —

(1) The annealed specimens Rc 17 produced the greatest curvatures.
(2) The fully hardened specimens Rc 63 produced the second highest curvatures.
(3) The specimens in the range of hardness Rc 53 and Rc 58 produced the minimum curvature.

These results indicate the feasibility of present day practice where tool steels are tempered slightly from the "As Quenched" condition before they are ground. This reduces their sensitivity to cracking.

These data represent tests on a variety of metal ground both wet and dry and in general show good correlation and corroboration. It is not the intent of this paper to attempt to show wide generalizations. However, data have been offered that extend these results beyond one material.

In summary these data indicate the following:—

A) DOWN grinding produces definite and well defined grinding characteristics that differ from UP grinding.

These include—

1. More visual sparking.
2. More power consumed.
3. Greater wheel breakdown.
4. Lower grinding ratios.
5. Less glaze on wheel face.

B) However, despite these substantial differences in wheel performance there is no difference in the amount of stress and curvature produced in the ground surface whether UP grinding or DOWN grinding was used.

CONCLUSIONS

1. In surface grinding, conventional crossfeeding at both ends of the table reverse produces the same degree of stress in the ground surface that is produced by crossfeeding at only one end.
2. The performance characteristics of the wheel are changed by the method of crossfeeding.
3. Whatever method will produce the most satisfactory end product can be used without changing the residual stress in that product. • • •

LIST OF REFERENCES

1. Letner, Harold A. "Application of Optical Interference to the Study of Residual Surface Stresses." Proceedings of the Society for Experimental Stress Analysis—Vol. 10 No. 2 pp 23-36 (1952).
2. Letner, Harold R. and Snyder, H. J. Grinding and Lapping in Manganese Oil Hardening Steel." A.S.M.E. Transaction Vol. 75 pp 873-880. Discussion on pp 881-882—July 1953.
3. Letner, Harold R. "Residual Grinding Stresses in Hardened Steel." A.S.M.E. Transactions Vol 77 pp 1089-1095. Discussion 1095-1098 October 1955.
4. Tarasov, L. P., Hyler, W. S., and Letner, H. R. "Effect of Grinding Conditions and Resultant Residual Stresses on the Fatigue Strength of Hardened Steel"—Proceedings, American Society for Testing Materials—Vol. 57 p 601 (1957).

CONTROL the finish ...and the **COSTS** with the

No over-finishing . . . no under-finishing with the Brush Surfindicator. Weighing only 15 lbs. and ready to be plugged into any 115 volt outlet, it provides on-the-job instant surface measurement. Controlled finish is now practical—inexpensive—and extremely profitable.

The Brush Surfindicator measures any surface—any shape—any size. Accurate measurements in microinches can be seen at a glance! It brings you laboratory-precision measurement unaffected by magnetic fields, vibration or line voltage variation. It requires no skill . . . can be used by anyone who can read a meter. Measurements are easily made

surfindicator

in complete compliance with the new ASA and military standards. Write for the ASA standards and all of the complete facts on this profit-making tool that will pay for itself!

brush INSTRUMENTS

DIVISION OF CLEVITE CORPORATION

3405 PERKINS AVENUE CLEVELAND 14, OHIO

wherever abrasive operations are performed

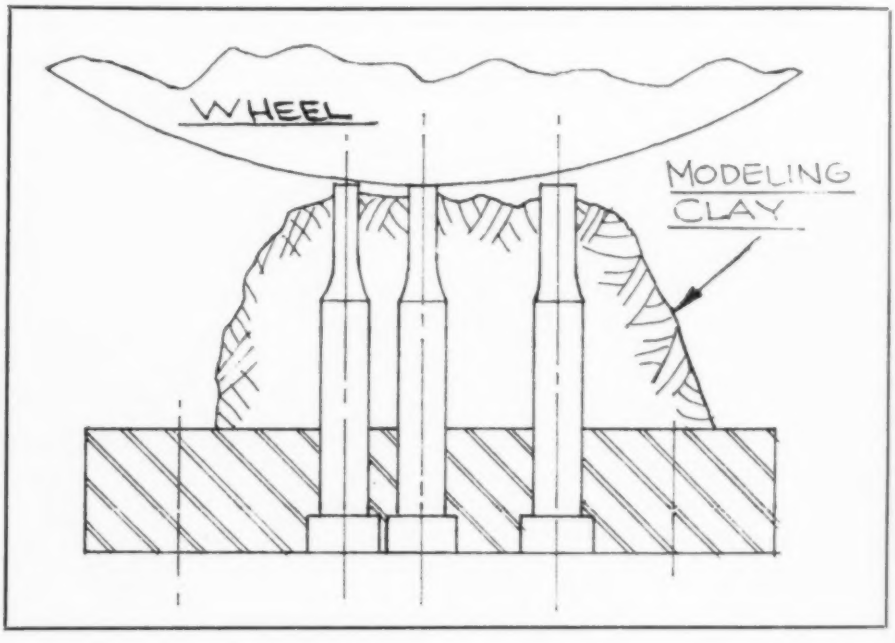
SHOP HINTS

Pack Pierce Punches with Modeling Clay

By **Howard W. Deunk**

● Small pierce punches tend to vibrate and break during grinding, unless extra support can be provided. Wrapping rubber bands around the punches was our first solution, and this worked fairly well. Now we pack the punches with inexpensive modeling clay, which can be used over and over again, and find that our breakage problem is practically nil.

Packing and stripping the modeling clay can be done quickly, thereby reducing down time between grinds to a minimum. •



Sketch of pierce punches packed with modeling clay for grinding. A little experimentation may be necessary to determine the best amount to use.

Plugs for Open Exhaust Lines

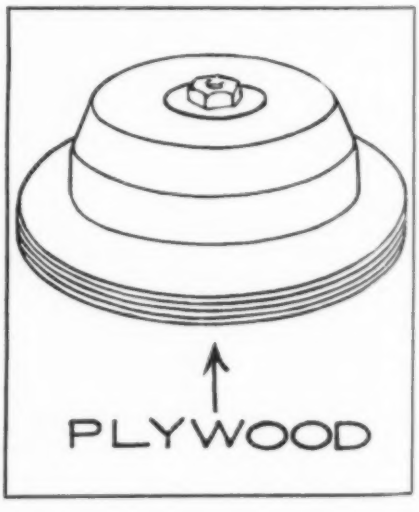
By **Buckley Sullivan**

● Our grinding department has a large number of small grinders, each equipped with an exhaust line leading into a central dust-collecting system. These grinders are occasionally not used for a day or two, or since they are quite small, are frequently moved elsewhere in the shop for a production job.

In either case, when the grinder is not in use or is away, the exhaust line or lines leading to it are not needed. To eliminate the wasteful loss of pressure in lines which are not being used, and to keep our bag-type central dust collector free of cigarette butts, lunch left-overs and the like, we made up a number of simple wooden plugs, as shown.

It is now required of each operator, when he shuts off his grinder for the day, to slip one of these plugs into the end of the exhaust line at his machine. Then if the machine is not used for the next day or two, or is removed temporarily, the line is effectively blocked off from the system, and pranks are greatly reduced.

The plugs cost next to nothing, slip in place readily, and are held in place by the vacuum created when the line is closed off. Also, inasmuch as only about one-third of the machines are in use at any one time, we now do very nicely with one-half the blower capacity formerly required when the unused exhaust lines were open. •



Sketch of plug for exhaust lines. The body of the plug may be made of any convenient scrap, to fit snugly into the opening. The top, slightly larger, is usually made from ½" or ¾" plywood.

(continued)

Crush Form Simple Contours

By **H. J. Gerber**

● It is possible to accurately crush form a grinding wheel to simple contours without making up a crushing roller and without any complicated holding device.

The photo shows one method we have used a number of times with considerable success. A radius is being crushed into the face of a six inch diameter vitrified wheel mounted on a tool and cutter grinding machine. The contour in the wheel face was produced by contact with a 24" length of ⅝" diameter drill rod. The drill rod has been

Checking a radius crushed into the face of a six-inch diameter wheel by the drill rod shown beneath the wheel. The drill rod is tack welded to a heavy piece of flat stock which has been clamped to the table of the cutter grinder. Guard removed from the wheel for the photograph.

tack welded to a heavy piece of m.s. flat stock which is in turn clamped to the table of the cutter grinder.

The wheel head is lowered to bring the wheel face in contact with the drill rod while the table is hand traversed a distance equal to the circumference of the wheel. Continued passes are made with the table while lowering the wheel head to maintain considerable pressure between the periphery of the wheel and the crushing form.

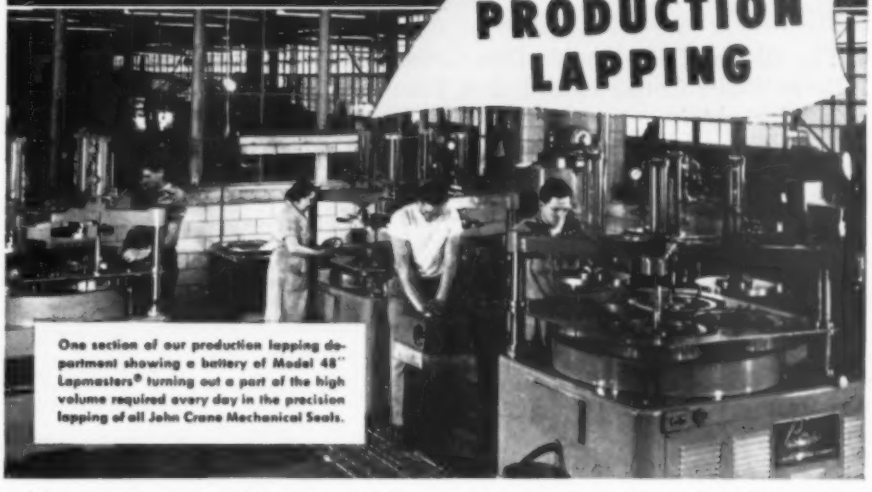
It is a good idea, if this process is performed dry, to periodically use an air hose to blow wheel grit off the crushing form. It may even be necessary to occasionally use a piece of abrasive cloth to clean off slight scratching burrs on the drill rod.

This technique will do a satisfactory job at low tooling cost either on this type of machine or on a surface grinder. One limitation is, of course, the fact that the table travel of the machine must be at least equal to the circumference of the grinding wheel being formed.

Square and rectangular forms have also been dressed into the periphery of wheels in our shop and I see no reason why a combination of several forms could not be produced by welding up several lengths of bar material in various forms to make a more complex contour.

As in any crushing job, it is necessary to select a grinding wheel which has a friable bond. • • •

How The Answer To Our Own Problem Has Helped Other Manufacturers SAVE MONEY WITH PRODUCTION LAPPING



One section of our production lapping department showing a battery of Model 48" Lapmasters® turning out a part of the high volume required every day in the precision lapping of all John Crane Mechanical Seals.

A few years ago, we had to find a *faster* and *better* way to produce flatness and finish on mating parts in order to keep up with the constantly growing demand for John Crane® Mechanical Seals.

Lapping was the only way of meeting our rigid quality specifications...but available lapping equipment could not *consistently* turn out acceptable work at the production rates demanded. With necessity, the mother of invention, we developed the Lapmaster® and solved a serious problem.

HERE'S WHY hundreds of manufacturers have since discovered the time and money saving advantages of automatic lapping with the Lapmaster:

- The Lapmaster eliminates production bottlenecks frequently caused by old lapping methods.
- You can depend upon flatness within tolerances of .0000116" or less with absolute uniformity, piece after piece.
- No downtime for truing lap plate...conditioning rings automatically keep plate flat and true.
- Product performance and quality improved...rejects cut to minimum. .inspection costs reduced.
- Operator need not be experienced in the art of lapping.
- Frequently eliminates other machining operations.
- Handles large or small parts...any shape or form ...any metal, ceramics or plastic materials.

HOW TO PROVE TO YOURSELF
That the Lapmaster Can Save You Money, Too

Send us samples and surface flatness and finish specifications of parts...we'll test run them in our experimental lapping laboratory and furnish you with a complete production report without obligation. Or write for FREE Booklets with complete facts on producing and measuring precision flatness and finish.

Crane Packing Company, 6417 Oakton St., Morton Grove, Ill. (Chicago Suburb)
In Canada: Crane Packing Co., Ltd., Hamilton, Ont.

John Crane

CRANE PACKING COMPANY

ACCURACY, AUTOMATION

PROMPT DESIGN OF

NEW DOUBLE DISC GRINDER

✓ *Accuracy up to .0001".*

✓ *New automatic dressing technique.*

✓ *Quill type spindle increases accuracy by allowing smoother movement.*

✓ *Universal micrometer adjustments of heads.*

● The all new DH4 Double Disc Grinding Machine by Besly-Welles Corp., South Beloit, Illinois, has been designed to obtain accuracies up to .0001", dependent upon the application, with complete automation and utilizing a unique quill type spindle arrangement. The accuracy has been obtained by careful study of all the operational parts and by a new dressing technique. Automation has been provided wherever advisable and has greatly reduced abrasive replacement time. The quill type spindle allows a smoother, more positive movement and precision control by making it unnecessary to move the heavy heads, subslides and motors.

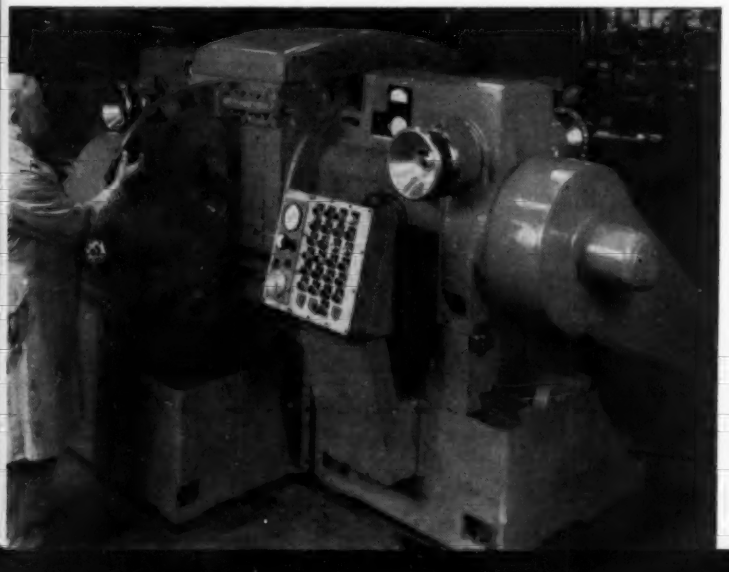
ACCURACY

In order to obtain the highest accuracy almost every part in the machine must be carefully considered. Starting with the base of this machine, the engineers have designed a sloping back which increases the machine support at the floor line without increasing the overall area required. The two spindle motors are mounted by means of a hinge arrangement to the sub-slides but the weight of the motors is supported by the base of the machine. The sub-slides are moved only during the set-up of the machine.

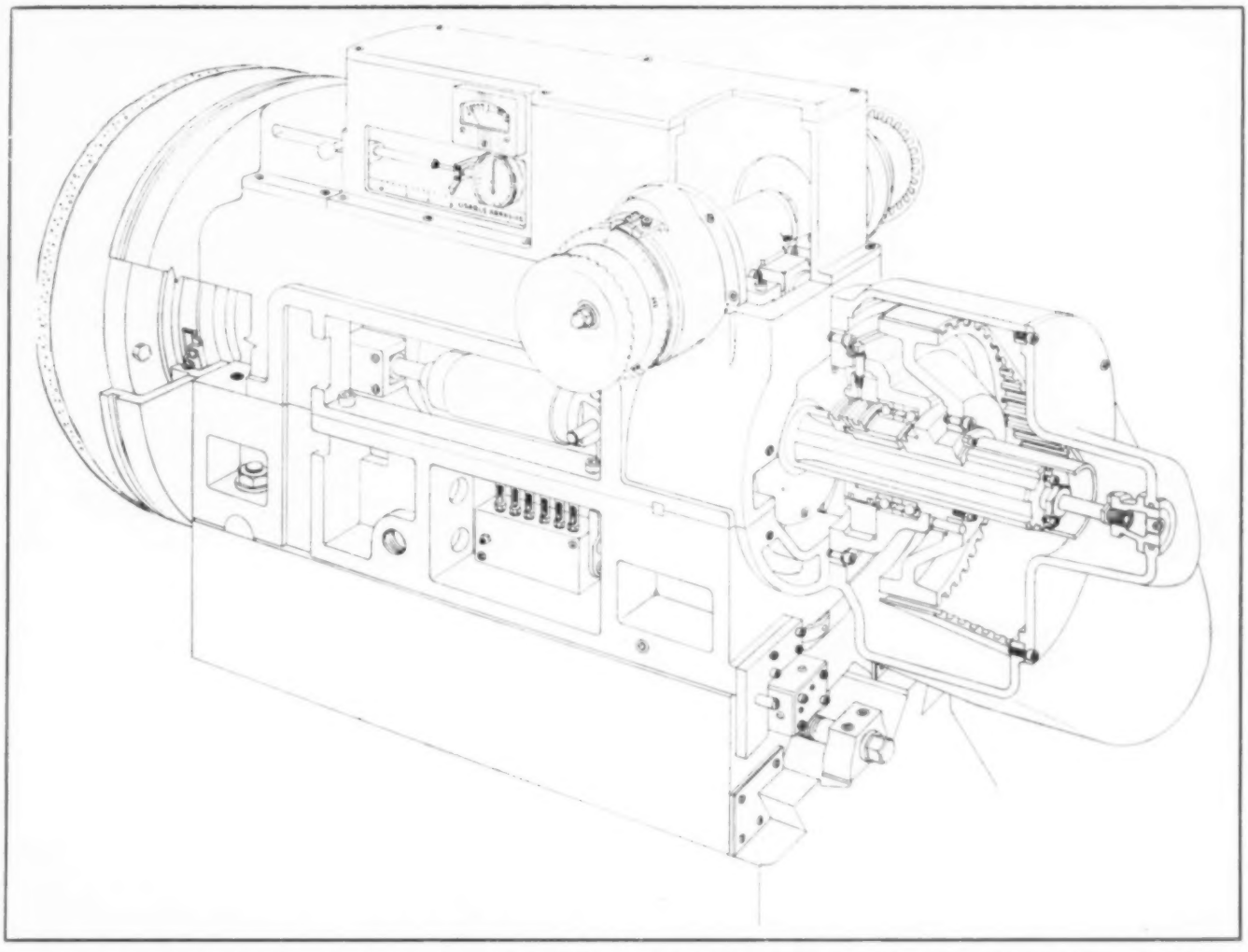
Timing belts are used to eliminate vibration while providing positive spindle drive. The spindle pulleys are mounted on spline sleeves supported on ball bearings which absorb the belt loads and eliminate spindle deflection.

Accuracy of double disc grinding depends a great deal on the dressing. For this reason the heads are aligned to the dresser. Both heads are provided with universal micrometer adjustments. Through the use of dial indicator gage the three points on which each head rests can be adjusted to bring the heads on line with a common centerline and in proper reference to the dresser.

Feed of the abrasive wheels to the work is another point which determines the accuracy of the machine. The DH4 uses a quill type design to reduce the amount of weight which must be moved. Precision compensators provide for feed increments which can be pre-set for .0001" to .003" per impulse. The handwheels can be adjusted forward or backward at any time manually. Normally the feed is actuated by push button from the central control panel. When sizing units are furnished with the grinder the compensators can be coupled to operate automatically from the sizers.



Front view of the Besly-Welles DH4 Double Disc Grinder with rotary fixture. Note the central control panel and automatic gaging.



The above perspective drawing shows the features of one of the DH4 heads. Starting from the left is the diaphragm seal on the quill, above is the motor load meter, built in gage and dial indicator for usable abrasive and quill movement, just below the indicator is the 3" cylinder for quill pressure, above the right end of the cylinder is the hand wheel for forward or backward adjustment of the quill, the cutaway view to the right exposes the timing belt and the rifle drilled spindle to carry the coolant.

The quills are sealed with diaphragm dust seals which completely protect the quills against damaging foreign matter. The quills are of triangular design for ideal three point support and ride in adjustable, lubricated ways for sensitive feed control. By not having to move the heads, sub-slides and motors, the feed is smooth, positive and precisely controlled.

Centerline quill pressure is produced by two 3" diameter cylinders which eliminate back-lash in the feed screw and worm gearing. Pressure is exerted in the same direction whether grinding or dressing thereby assuring absolute feed control without "lost motion."

DRESSING

During the automatic dressing operation, a "U" shaped spacer is retracted from the feed screw allowing the quills to move apart a pre-determined distance. This provides the necessary spacing of the abrasive wheels for the entrance of the dresser.

The abrasive wheels are then moved into the dresser by the compensator units. The amount of abrasive removal can be pre-set from .001" to .003" per impulse of the compensator and occurs before each stroke of the dresser.

After dressing is completed, the quills return to the grinding position, compensating for the abrasive removed during dressing. The entire dressing operation is automatically cycled from the central push button control panel.

The spindles and wheel collars are of one piece construction riding in precision pre-loaded ball bearings for maximum rigidity. The spindles are rifle drilled to carry coolant directly into the grinding zone from a new multiple level "Space-Saver" coolant tank.

Dirty coolant is pumped from the grinder to a filter in the lowest tank where foreign matter is removed. The coolant is then pumped to the upper tank where it flows by gravity into the middle tank from which it is returned to the grinder. This unusual arrangement allows vastly improved air circulation around the tanks for highly efficient heat dissipation, besides saving a considerable amount of floor space.

WHEEL CHANGE

In the past, changing abrasive wheels has been a one hour job at best. After mounting a new pair of abrasive wheels, the operator had no way of

knowing where the faces of the abrasives were and therefore had to "feel" his way back to the desired grinding planes.

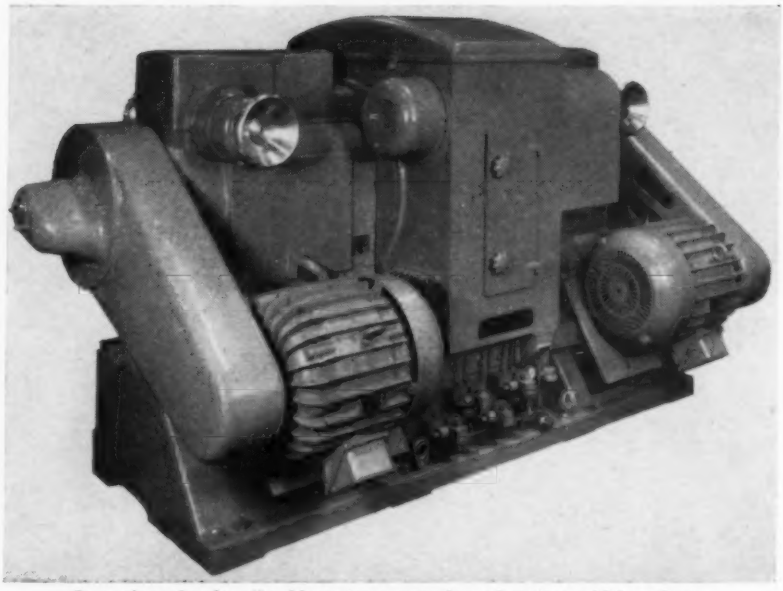
This problem was considered on the DH4 with provision made to automatically return the abrasive wheels to their proper grinding positions after mounting and dressing.

This is accomplished in three simple steps.

(1) Operator opens the quills to their outermost position by pushbutton control.

(2) Worn discs are removed and replaced with new abrasives.

(3) The wheel spindles are then started and the dresser button depressed causing the dresser to operate while the abrasives are moved manually into contact. The dresser then is switched to automatic and the dress button depressed causing an automatic dressing cycle to occur after which the abrasives return to the correct grinding position.



Rear view showing the hinge type mounting of motors which reduces the weight on the sub-slides.

Motor load meters built into each head indicate to the operator when the main spindle motors are being overloaded or when the abrasive wheels need dressing. Also built in are gages which show the operator the amount of usable abrasive left in the wheels at all times. Precision dial indicators also built in show the exact amount of movement of each quill obtained from the compensators.

Three basic types of fixtures are available for use on the Besly DH4 Grinder.

The Rotary Type fixture consists of a continuously rotating disc provided with suitable openings or fixtures arranged to hold and carry the work between the abrasive discs. This type of fixture lends itself to automatic loading and unloading.

The Thru Feed Type fixture passes the work through the grinder in a continuous stream. A pair of guide bars confine the work pieces as they pass through the grinding zone.

The Oscillating Type fixture consists of a blade or work holding fixture attached to a swinging arm arranged to oscillate the work between the abrasive discs. • • •

Now! Equip your tool-room with the most accurate, dependable surface grinder available. Out-performs many similar makes costing far more. Made by grinding specialists to assure you of superior results—time after time!

- Solid one piece construction of spindle housing and verticle slide.
- Elevating screw centrally mounted.
- Combination "V" and flat ways assure positive alignment.
- Angular rack and pinion face.
- Motorized spindle, dust collector and water unit available.

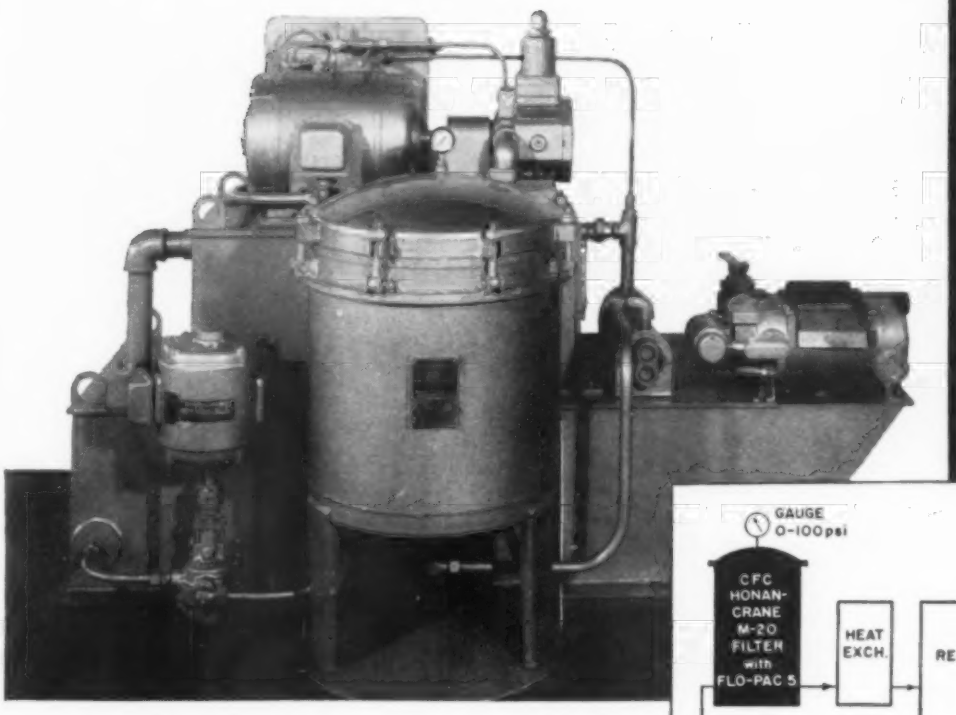
HARIG GRIND-ALL FIXTURE
For fast, accurate perforator grinding . . . milling, boring and inspection.

NEW! RADIUS DRESSER ARM
Quickly converts Harig's Grind-All Fixture into a precision Radius Dresser.

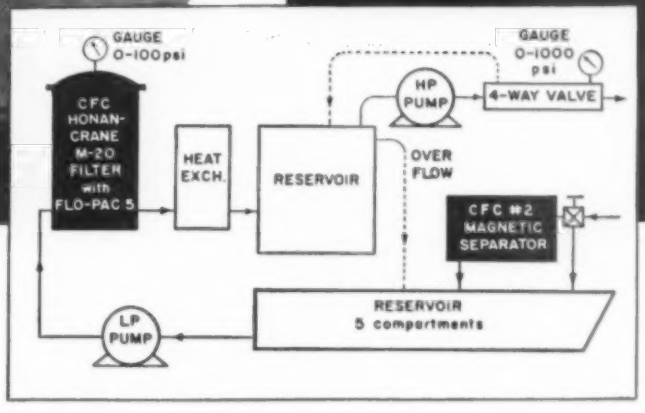
WRITE FOR LATEST BULLETIN

Harig Manufacturing Corp.

5760 W. HOWARD ST. • CHICAGO 31, ILL.



This installation, designed and built for a leading electrical manufacturer by Hydro Air Engineering, Inc., St. Louis, Missouri, supplies mineral oil coolant, 90 SUS, at 600 PSI, to target drill. CFC Magnetic Separator removes ferrous contaminants. Oil then passes through compartmented reservoir to provide sedimentation of remaining particles. CFC Honan-Crane Filter then acts as polishing filter to take out contaminants not already removed.



"ON-TARGET" FOR REDUCED COSTS

Hydro Air Engineering, Inc. unit cuts downtime with CFC Honan-Crane Filters and Magnetic Separators

This Hydro Air Engineering, Inc. Unit assures reduced costs on target drill operation by keeping coolants micro-clean with CFC Magnetic Separator and CFC Honan-Crane Filter. Drill has extremely heavy chip load. By maintaining continuous supply of *clean* oil, CFC equipment protects the high pressure pump and valves, and prevents clogging of the drill ports. This means lower costs through reduced downtime, less tool breakage, and fewer rejects.

The low-cost CFC Magnetic Separator, with permanent Alnico magnets, removes ferrous chips automatically and continuously. It is compact, light-weight, easy to install. Unit includes totally enclosed gearhead motor. No separate pump is required.

The CFC Honan-Crane Filter employs the new Flo Pac 5 Cartridge — designed to remove 98% of all particles larger than 5 micron. Tough, resin-impregnated paper provides more than 6300 square inches of filtering surface, per cartridge.

For technical literature, or engineering assistance, write to Department GF.

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

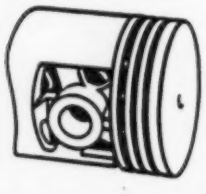
Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

POSITIVE DUPLICATION – EVERY TIME!

(PD) ° Exact duplication of one person's fingerprints by another person is impossible. Discovery of this amazing fact in 1891 changed the science of detection and identification throughout the world.

But Positive Duplication of grinding wheels by the CINCINNATI (PD) manufacturing process is a remarkable fact also . . . time after time !



Every time you reorder the centertype wheel shown above, which grinds this automobile piston, that CINCINNATI (PD) wheel will act and grind exactly like the original . . . saving you time and money, and maintaining your production.

This is true of *any* CINCINNATI (PD) WHEEL you specify: centertype, centerless, internal, surface, toolroom, and snagging wheels.

Another advantage for you is that every factory representative is a highly trained specialist in grinding machine set-ups and operations. For his help on those extra-tough grinding problems, see your CINCINNATI (PD) Grinding Wheels Distributor or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI®

GRINDING WHEELS

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

° Trade Mark Reg. U. S. Pat. Off.

grinding SAFELY

Got the "Code" in Your Head?

By **Richard L. McKee**
Associate Editor

● During the winter, many a word gets slurred over and mispronounced because the speaker's plugged nasal passages are not operating properly. A dejected character wrapped in an old bathrobe, sitting with his feet in a bucket of hot water, while his head is wrapped in an old rag and his eyes drip, has been the butt of cartoons since the time of the cave man.

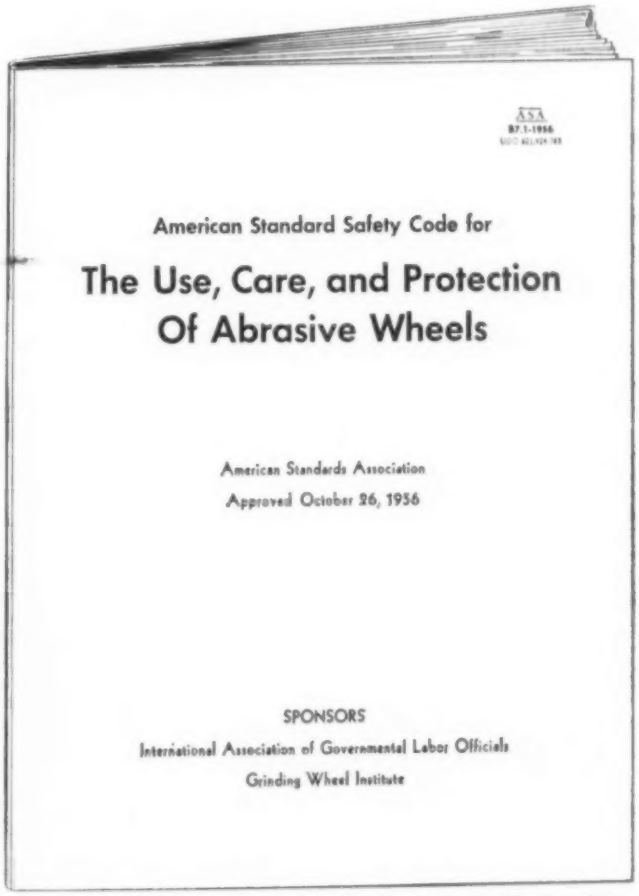
The "Code" of abrasive safety, however, is the American Standard Safety Code for "The Use, Care and Protection of Abrasive Wheels." And while no one could be expected to keep in his head all the details of the 74 pages in the current (1956) revision, a general knowledge of its provisions and access to a copy for more detailed information is a necessity for every user of abrasives.

This is no "Johnny-come-lately" publication. It represents the cumulative experience of approximately forty years. In 1917 the need for such a publication was recognized by the Grinding Wheel Manufacturers and the Machine Tool Builders, and the first tentative American Standard was issued in 1922. This was revised and first issued under its present title in 1926. The current brochure is the fifth revision.

In its current format, the material is presented in two parallel columns, a left-hand column printed in bold type and limited to the code regulations, and a right-hand column of explanatory information, to clarify the regulations and present the basic reasoning behind each rule.

Since the code must of necessity be general, many companies have adapted its provisions into their own safety rules. These company safety rules can be more specific, and can emphasize the things which are of greatest concern in their particular situation. In many cases such rules are more stringent than those of the Code.

Each user of abrasives, in fact, everyone who has anything to do with abrasives, needs to be familiar with these regulations. Whether your company follows the American Standard Safety Code or has published its own version, GET A "CODE" IN YOUR HEAD AND THEN USE IT. • • •



(Copies of the American Standard Safety Code for "The Use, Care, and Protection of Abrasive Wheels," are available without charge from the Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.)

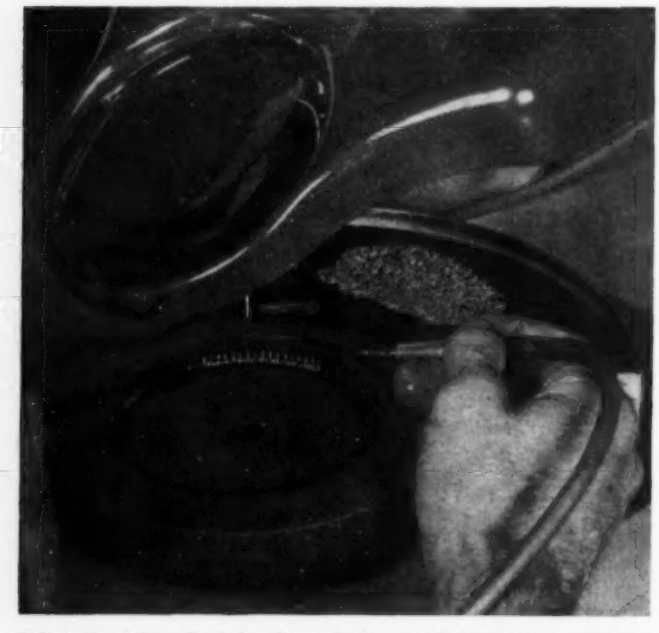
Thin Wall Diamond Bits For Hard Materials

- ✓ *Lowered production time for drilling glass, ceramics, granite, and similar substances.*
- ✓ *Reduced scrap and breakage.*
- ✓ *Higher output per bit.*

By **W. H. Hampton**
President
Hoffman Bros. Drilling Company

● Thin Wall Diamond Bits, which might be very roughly described as hole saws with a cutting edge of diamonds, are one of the most efficient precision tools yet developed for high speed production drilling, grinding and finishing of the hardest materials. Glass, marble, ceramics, granite, fused cast refractory blocks, reinforced concrete and zac block are a few of the hard materials which can be cored and finish ground by these bits at a rate comparable with that of other advanced production equipment. Developed by Hoffman Bros., these bits fill a need for highspeed drilling and finishing tools primarily for use on hard non-metallic materials. Successful tests for the use of these bits on hard metals have also been completed, though detailed data on this application for production are not yet available.

Extensive use of thin wall diamond bits first began in the glass industry when it was found that glass and ceramic items having face widths as low as .015" could be processed economically and at high speeds. An instance of this is in the finish grinding of glass stoppered laboratory or medicinal bottles. At the point where such products are ground, the material is extremely thin, yet considerable accuracy must be maintained to assure a tight fit of the stopper. Prior to the use of thin wall bits, the production of these items on ordinary equipment was a slow process, and losses from breakage were high. On this and like jobs, the surprisingly low breakout of Hoffman bits eliminated excessive reject losses and cut production time to one-third or less of that required by previous methods.



Oriented setting of whole diamonds into mold for Hoffman Surface Set Bit.

These first diamond impregnated thin wall bits developed for glass manufacturers were produced by carefully blending sieve diamonds with bonding agents such as cobalt and iron, cobalt and tungsten or other similar bonding materials. In actual use it was determined that the diamond sieve size and the bonding agent had to be varied with the material to be penetrated.

Today these Hoffman "Diamond Impregnated" bits are produced in varying blends of thirteen different bonding mixtures and nine different sieve or mesh size diamonds. The diamonds vary in size from 35 sieve to 140 sieve, and the face width or the "kerf" of the bit from .015" to .125", depending on the material, the depth of cut, the speed of the drill and the lubricant. These bits are currently in use for coring juicer bowls, auto glass, medicinal bottles, zac block liners and ceramics, as well as being used on granite and marble statuary.

Tests are currently being conducted on the drilling of still harder materials for one of the leading tungsten carbide producers. To date, ½" O.D. impregnated bits are penetrating up to two-inch depths in carbide in a few minutes, with extremely favorable bit life.

The following case history illustrates the importance of individual research and bit design. A large eastern glass plant, using stock bits, was averaging 3800 ½" holes per bit, at a bit speed of 1850 rpm, on a hand fed operation, using water as lubricant. Samples of the material being cored were submitted to the Hoffman laboratory for thorough analysis. The tests resulted in a recommendation of a special bit with .032" face thickness and diamond depth of 3/16", with water lubricant maintained at 40 lb. pressure and an increase in drill speed to 3200 rpm. The average number of holes drilled per bit jumped to 16,000, breakage was reduced and the recommended diamond impregnated bit held O.D. gauge within .005" from its original manufacture. Additional tests demonstrated that changes from the manu-

Diamonds and matrix blends are bonded into tough, lasting bit heads in these sintering furnaces.

Determining the correct bit for coring zac block. Similar tests are in progress for applications of bits on ferrous magnetite, tungsten carbide and similar materials.

facturer's recommendations in either drill speed or lubricant pressure resulted in shorter bit life.

Diamond "Surface Set" bits make up the second large class of thin wall bits. These are most generally recommended for coring reinforced concrete, tile, sandstone, marble, granite and like materials.

Surface set bits, which have a face width of approximately ⅛", contain whole diamonds which are carefully oriented into molds according to one of several pre-arranged patterns. With diamonds ranging in size from 40 to 150 per carat, according to final bit use, this is a job for skilled crystallographers. All diamonds used are carefully graded as to size and crystal structure.

The matrix holding the diamonds is normally composed of cobalt and iron or similar materials. On these bits, it needs only to hold the crystals firmly.

Research by Hoffman, enlarging on basic investigations carried on by the U.S. Bureau of Mines, has indicated definite superiority of oriented over random set diamonds. Because diamond crystals are formed in layers or strata which vary in hardness, the longest bit life results when the diamonds are set so that the hardest diamond surfaces contact the work first. Strata analysis of each diamond crystal, along with setting it in proper relationship with the bit matrix, is known as "orientation" or "oriented diamond setting."

Hoffman surface set diamond bits are resettable, enough new stones being added to bring the bit up to original specifications when it becomes dull. The practice of sharpening or dressing a surface set bit by using an abrasive wheel is not recommended. While the wheel breaks the diamond crystals and produces a sharp edge temporarily, it also destroys the crystal value. Only the manufacturer should attempt to restore the cutting ability of these bits.

In the interest of economy and increased drilling versatility, Hoffman has introduced three grades of surface set thin wall bits. Superior Brand bits contain only top quality octahedral and dodecahedral diamonds. The value of this grade lies not only in the fast cutting action, but also in the number of times the bit can be reset. General Brand bits contain medium quality diamonds, at a lower price. Utility Brand bits, with smaller diamonds, are economical throwaway units. This type is highly successful where the material to be drilled contaminates the bit.

A third type of thin wall diamond bit, just recently produced by Hoffman for industrial users, is the "Combination Narrow Kerf" bit, combining some of the best qualities of both surface set bits and diamond impregnated bits. This type is recommended for drilling certain glazed or surface hardened materials where a break-in period is required for using an impregnated bit. With the combination bit, the surface set crystals take hold immediately and are set to actually break up during the drilling. This, in turn, exposes the impregnated diamonds to add increased sharp cutting life to the bit. The manufacture of these bits requires extremely careful control to assure exact timing of the diamond release.

Thin wall bits are used with water as the lubricant, or dry, according to the application. Oils are never used, as they tend to gum up the bits. Where water is used it is important that pressure be maintained at the recommended level.

Hoffman thin wall diamond bits are precision tool whose application requires careful balancing of such factors as the material to be ground, the equipment available, the lubricant and the pressure at which it should be applied, the composition of the matrix, the rpm of the bit, as well as its recommended face width and diamond depth. Standard core bit sizes range from ⅜" up to 12" O.D., and non-coring bits are available as standards in sizes from 1/8" to 15/16" O.D. The use of additional core barrels makes possible the drilling of holes up to 24" in depth, though depths over 18" are rarely required. Providing such recommendations, including all the necessary tests, is an additional free service of Hoffman Bros. • • •

Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

Proper Use of Coolant Means Better Abrasive Cutting

• Wet abrasive cutting eliminates burning, minimizes burr, and gives a finer finish than any other cut-off method—and the key to this quality is proper coolant application. Here are the three essentials of adequate cooling:

1. Volume of coolant, rather than pressure, must be kept at a high level for maximum wheel life.
2. Coolant must be accurately directed to the *point of contact* between the wheel and the work, because this is the point at which most heat is generated.
3. Coolant must be applied equally to both sides of the wheel to avoid crooked cuts and wheel breakage.

Radial holes in ALLISON wheels carry coolant deep *inside* the cut itself. This extra cooling action assures clean cuts and maximum wheel life on solids from 2″ to 12″ round or square. These holes also impart a self-dressing action to the wheel, keeping sharp grits exposed for cool, fast cutting.

Allison-Campbell Design Assures Proper Cooling

High volume of coolant is provided by a large reservoir and an extra-capacity coolant pump.

Good distribution of coolant is assured by a coolant distributor, standard on all CAMPBELL machines. This can be adjusted and locked in position to provide equal distribution of coolant to both sides of the wheel and to the work.

High-speed, quality cuts on almost *any* material are possible with modern abrasive cutting techniques. Your ALLISON-CAMPBELL Field Engineer will be glad to recommend the right machine and wheels for *your* cut-off jobs. Call on him for help.

A complete selection of machines and wheels for *any* cut-off application is offered by ALLISON-CAMPBELL. Four types of CAMPBELL machines—chop stroke, oscillating, horizontal, and rotary—in capacities from the smallest stock to 14″ rounds . . . billets up to 12″ square . . . plate up to 6″ thick and 20 ft. long. ALLISON wheels—more than 150 different specifications—rubber or resinoid bond—3″ to 34″ diameters—.006″ to 3/16″ thick.

Write for a copy of DH-20, a new bulletin describing the ALLISON-CAMPBELL Demonstration Laboratory, and how you can take advantage of the special services it offers. Complete details on ALLISON wheels and CAMPBELL machines are also available.

ALLISON-CAMPBELL DIVISION
AMERICAN CHAIN & CABLE

926 Connecticut Avenue, Bridgeport 2, Conn.

ACCO

wherever abrasive operations are performed

Questions and Answers

By Arthur Rakestraw

FLAT GRINDING WITH A BELT GRINDER

● It is said that a belt grinder does not grind flat. When grinding off-hand on a belt grinder this is found to be true, but on the other hand, when a fixture is used to hold down the work, the belt will grind flat. Our application is grinding a combination of tungsten carbide with metal and a brazed joint alloy of silver and copper, which is very difficult to grind with a belt because of the metals used.—P. L. Worcester, Mass.

If the abrasive back-up plate is flat and uniform pressure is applied without change of point of application for a sufficient period to permit the surfacing of the entire piece surface, we can see no reason why a belt would not grind flat. The difficulty in off-hand belt grinding is that uniform pressure is not maintained in one position until the piece is surfaced.

We wonder if you have reference to the flatness of the ground surface, or possibly to the loss of parallelism of the upper and lower surfaces. If the upper and lower surfaces are parallel at the start, and even pressure is applied to the part during grinding, the parallelism should not be affected.

Your problem of belt surfacing a combination of tungsten carbide and some other metal would present a problem if off-hand pressure were to be used. Metals will be removed at rates dependent on their resistance to wear or abrasion. The tungsten carbide, being the harder of the two metals, will wear less, while the softer metal will be removed at a more rapid rate. The only possible way to eliminate uneven abrasion would be to make use of a fixture which will insure that dimensions will not be altered.

Whether you made use of a belt or an abrasive disc, parallelism of the upper and lower surfaces would be drastically changed with off-hand applied pressure.

We realize that you did not mention the overall shape of the brazed combined parts, but we wondered if possibly the surfacing could be performed on some type of surface grinder, with a magnetic chuck for the holding fixture. •

ELLIPTICAL GRINDING ON CYLINDRICAL

● What could cause a cylindrical dead center grinder to grind a .0002"-.0008" elliptical shape? This was checked on a 60° V block.—P. S. Milwaukee

There are a number of conditions that might cause results such as you have enumerated. Of greatest importance is the condition of the work piece centers. These centers should be lapped to remove any irregularities resulting from centering drills. Any slight irregularity will be reproduced as the piece rotates past the grinding wheel.

If the work piece is rough ground with comparatively heavy infeeds, it is possible that the diametrical surface is elliptical. Finishing cuts, due to slight play in the table, ways and possibly the wheel head, may permit the wheel to follow the elliptically rough ground surface.

Still another possibility is that the dead center head and tail stock centers are not in perfect alignment. If slightly out of line, the work piece center will travel in an elliptical path on the fixed centers, thereby causing an elliptical O.D.

In the majority of cases, however, slight differences in O.D. contours are the direct result of faulty work piece centers. •

EFFECT OF VARIATIONS IN WHEEL DRESSING

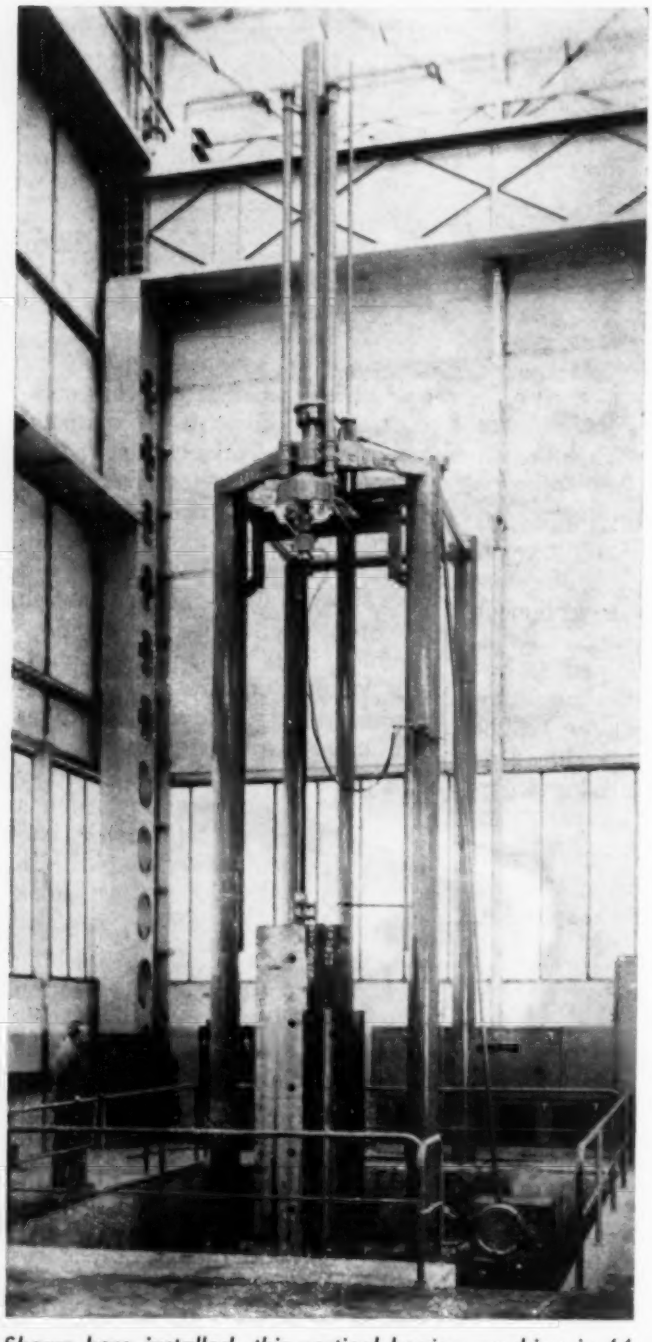
● I have heard that it is possible to make a wheel act coarser or finer by varying the method of dressing. How is this done?—M. H. Rochester, N. Y.

Variable grinding action from a single grinding wheel specification is accomplished by varying the rate of diamond traverse across the wheel face. A comparatively slow traverse produces helical ridges on the wheel face that are very compact, particularly if the diamond nib is of comparatively large radius. Repeated dressing traverse passes, with diminishing infeed of the diamond, produces a very smooth wheel face, which will produce a fine finish. In fact, such a smooth dressing might lose its grinding characteristics to the point of burning. With a comparatively fast diamond traverse, the helical ridges are more widely separated, producing the effect of coarse, widely separated abrasive grains. Such a dressing would act coarse and would produce a very rough finish although it would remove stock rapidly.

An example of ultra finishing with a coarse wheel specification is the operation of cylindrically grinding aluminum pistons. In the war years, aircraft engine pistons were cylindrically ground, using silicon carbide wheels in 46 grit. By using slow dressing traverse speeds, with diminishing increments of infeed over a prolonged dressing period, the wheel face was reduced to an absolutely smooth surface. The voids between surface grain allowed for chip removal without loading, yet the resulting finish required no lapping. •

WORLD'S LARGEST VERTICAL HONING MACHINE DELIVERED

• A vertical honing machine which is 44 feet tall, the equivalent of a five-story building, has just been delivered to a customer in Europe by the C. Allen Fulmer Co., of Cincinnati, Ohio.



Shown here installed, this vertical honing machine is 44 feet tall, has a stroke of 144" and a diameter capacity of 30".

This machine features a stroke of 144" and a diameter capacity of 30". The work table can accept work weighing up to 80,000 pounds and has an in-and-out travel of 72" to permit an overhead crane to drop heavy work directly onto the table. The honing machine has a swing of 96".

An oversize coolant system includes a 450 gallon reservoir with an automatic recirculating filter to provide maximum efficiency in coolant separation. Coolant volumes of over 30 gallons per minute can be delivered to the work and the large volume of coolant in the reservoir insures efficient honing without the use of a coolant refrigerator.

Reciprocation of the honing machine spindle, and thus the honing tools, is by means of twin hydraulic cylinders, using Fulmer's patented hydraulic counterbalance circuit, with reciprocating speeds adjustable by the operator from zero to 70 feet per minute. A 25 HP motor powers the main hydraulic reciprocation system, with a separate 3 HP motor to operate the auxiliary hydraulic systems. Spindle rotation is by means of a 40 HP motor through proper gear reductions so that the operator can select any one of eight spindle rotation speeds from 11 rpm to 108 rpm.

This new machine incorporates the Fulmer system of positive hydraulic control of honing tools. This efficient system maintains the advantage of positive "opposed-cone" type of hone expansion plus complete control over the amount of hone expansion and the stone pressure. The hone head is expanded and contracted upon signal from push buttons at the operator's position or by the automatic timing or sizing system built into the machine. The tools can be caused to run through a "spark-out" cycle of any desired length and then withdraw from the work and shut off the machine. The honing machine operator can select either manual push button operation or automatic operation, but can always manually interrupt or override the automatic cycle.

A total of 68 horsepower is used to drive this honing machine, permitting large diameter cylinders to be economically honed. Although the maximum stroke is 144", cylinders up to 15 feet long have been honed using the "double-end" method. In spite of its extreme size, the Fulmer Model 30/144 Honing Machine will still produce work to the same tolerances as smaller machines. For example, during the initial demonstration, a hydraulic cylinder 11" in diameter and 10 feet long was honed to ±.0002" for size and concentricity.

• • •

ALMCO BARREL FINISHING CUTS DEBURRING TIME 75% ON JET PARTS!

TWO GIANT ALMCO MACHINES cut deburring time 75% on turbojet engine parts made by a large aircraft engine components manufacturer.

In just 2½ hours, a barrel load of 14 jet vane and shroud assemblies is descaled, ground, deburred, cleaned and rust-inhibited. A custom-made fixture holds these assemblies rigid and stationary as two tons of abrasive media smooths every surface and crevice of the intricate parts!

These rugged Almco machines eliminate hand deburring, vapor blasting and wash operations. There is less chance of damage to components . . . better mating of parts in the completed engine . . . better balance . . . increased part life.

WHETHER YOU NEED a large special machine like the one shown or a smaller Almco barrel finishing unit, you can get expert advice without obligation. Write on company letterhead asking for an Almco engineer to call. Or send sample parts with specifications on results desired. You will get a prompt, factual report from the Almco lab.

SEND FOR THIS NEW BARREL FINISHING HANDBOOK

Complete description of the most advanced modern processes. 52 pages of facts, photos, data and cost comparison charts. Write for your copy.

ALMCO

Queen Products Division • King-Seeley Corporation
131 E. Main St., Albert Lea, Minnesota

Sales Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven and Philadelphia

IN ENGLAND: *Almco Division of Great Britain Ltd., Hitchins, Herts, England*

wherever abrasive operations are performed

Free Literature

For further information on any of the products listed here, use the handy postpaid card opposite page 72.

1. Air Turbine Grinding Head, the Grind-A-Matic, is described in folder. For continuous high precision internal grinding, the grinding head can be mounted either vertically or horizontally on almost any machine. Illustrations, specifications, and parts listings are included. Radial feed can be adjusted while spindle is rotating. Fine radial adjustment can be made in increments of .0002" over a range of "0" to .070" dia.; coarse adjustment from "0" through 1¼". Holes from ⅛" through 2½" may be precision ground. Spindle speeds to 75,000 rpm with the standard air turbine; to 12,000 rpm with the Cat. No. C-5872 air turbine available as accessory. Threadwell Tap & Die Co., Greenfield, Mass.

(See Number 1)

(See Number 2)

(See Number 3)

2. Mounted Wheels. Bulletin available illustrates all mounted wheels full size, with exact dimensions and prices. There are 200 standard sizes and 86 standard shapes available in a variety of bonds, including vitrified, resinoid and soft rubber polishing. Chicago Wheel and Manufacturing Co., 1101 W. Monroe St., Chicago, Ill.

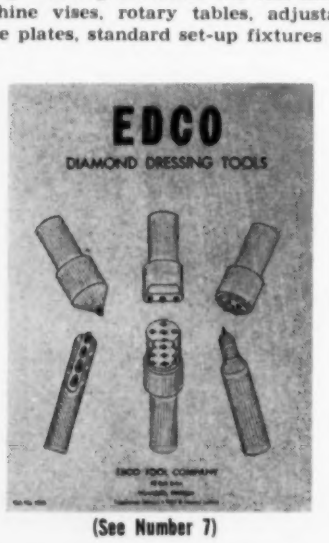
3. Gage Block Inspection. Bulletin 8-5 describes the need for and availability of gage block inspection. Two types of inspection service are described. Recalibration of working blocks includes cleaning, burr removal and a complete report on individual sizes and surface conditions. Fonda's inspection of laboratory blocks and those for fine comparator work includes, in addition, parallelism deviations and an optical check for flatness. Fonda Gage Co., Inc., Stamford, Conn.

4. Vises and Work Holding Fixtures. A 24-page catalog describes the full line of machine vises, rotary tables, adjustable angle plates, standard set-up fixtures and the new Universal Clamp-N-Jack Set-Up System for all types of machine tools. Current prices and a list of local dealers are given. Universal Vise & Tool Co., Parma, Mich.

5. Electromagnetic Vibrators, for vibrating bins, hoppers and chutes, are covered in recent catalog. Complete descriptions, data and specifications are given for fourteen standard electromagnetic vibrators, ranging from models for vibrating less than one cubic foot to models capable of vibrating bins, hoppers and bunkers containing materials weighing in excess of 150 tons. The catalog also gives details concerning controllers, waterproof, dust-tight cases for vibrators, and explosion-proof cases for vibrators and controllers. Syntron Co., 300 Lexington Ave., Homer City, Pa.

6. Coated Abrasives users and distributors will be interested in the Diamond Grit "Sandpaper Sense," issued four times yearly by Canada Papers Ltd., Plattsville, Ont., Can. The Fall Issue available contains the Spalding Story, relating the history of this producer of athletic equipment, and how diamond grit products of the Canada Sand Papers add the gleam to their golf clubs and smooth finish to their badminton and tennis rackets. Galt Malleable Iron Ltd. and Canadian Welding Works Ltd. are also written about, with explanations of how Canada Sand Papers has been of service.

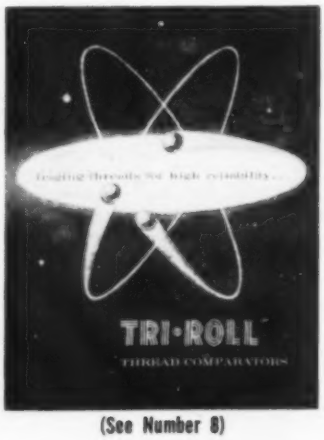
7. Diamond Dressing Tools, in all types and styles, as described in recent catalog include single point dressers, faceset dressers, edgeset dressers, layerset dressers, lineset dressers, sliverset dressers, sidemount dressers and thread grinding dressers. The manufacturer reports only the premium grade of Brazilian diamonds are used in Edco dressing tools and the scientifically engineered matrix used in setting the stones assures best tool life. Diamond dressing tools can be produced to customer specifications. Edco Tool Co., 93 Oak St., Wyandotte, Mich.



(See Number 7)

8. "Gaging Threads For High Reliability . . ." is the title of brochure on the Tri-Roll thread comparators. The inspection unit indicates not only that a piece is good or bad, but shows where the part lies in the tolerance range. Other advantages stressed are repeatability, three-point contact, speed and ease of operation. Only 12 different frame sizes are required to cover the diameter range from No. 0 to 3⅜". Types of gage rolls are diagrammed, with instructions for selecting gage rolls. Illustrations cover a wide range of applications, and also how to analyze the readings. Specifications included. Pratt & Whitney Co., Inc., Charter Oak Blvd., W. Hartford 1, Conn.

9. Grinding Attachment, as described in catalog, fastens to the top of the compound slide rest and may also be used for a variety of milling and drilling operations. Pivot polisher and grinder has



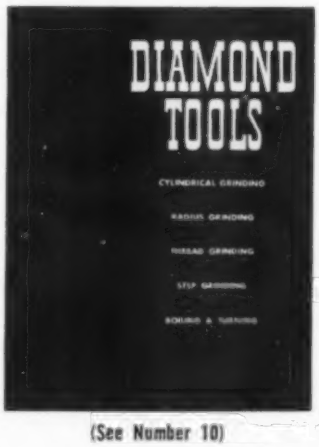
(See Number 8)

slide the same as used in the compound slide rest, with swivel head graduated in degrees and locked in place by an eccentric. Accessories are listed for this polisher. A grinding wheel mount is also described. With the wheel truing attachment, it is simple to true a grinding wheel used in the grinding attachment or milling attachment, and it is furnished complete with clamping bolt and diamond. These items are part of the manufacturer's catalog on precision lathes, micro-drill presses, micro drills, micro-drilling machines, contact lens equipment, among others. Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, Calif.

10. Diamond Tools. Pictures, diagrams, mounting instructions and features are given in this guide in making the most practical use of a diamond tool. Cylindrical and straight face wheel dressing tools, radius and form wheel dressing tools, step wheel dressing tools, thread-grinder dressing tools, boring and turning tools, are some of the tools listed. A recommendation chart is given for each class of tool. The catalog is a help in determining the type and size of diamond tool preferred; others are made to customer specifications. Koebel Diamond Tool Co., 9456 Grinnell, Detroit 13, Mich.

11. Taper Correcting Device. The Gage-Line unit for Cincinnati centertype grinding machines is used for accurately measuring the movement of the swivel table to correct for taper in a workpiece after it has been ground and measured. Folder gives operations and highlights of the unit, which consists of two independently operated gage heads mounted on each end of the swivel table, and an electronic control unit conveniently located on the right end of the bed. The meter, taking signals from a control unit, is selective for a high range with a total reading of .020" and a low range with a total of .002". The device is applicable to the company's 4" to 14" plain grinders, and all sizes of their universal grinders. Grinding Machine Div., The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

12. Wet Abrasive Cutting Machine, Campbell Model 481, is described in Bulletin DH-84. This unit will cut solid billets, pipe, or structurals and any shape that will fit into an 8" circle or square. Hardened steel, titanium, high temperature alloys, corrosion-resistant metals reportedly can be cut at the rate of 8 to 10 sq. in. per minute. Work-holding fixtures, machine design characteristics, and complete specifications are listed. American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn.



(See Number 10)

INCREASE FILTERING EFFICIENCY—
DECREASE
FILTERING COSTS

with HENRY Automatic
self-cleaning liquid filters...
...for Industry

FLOTATION • PROGRESSIVE FILTERING • SETTLING

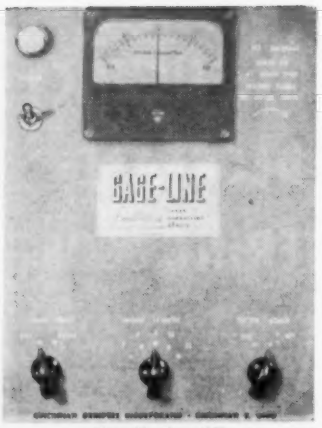
Henry Automatic liquid filters for industry combine all three basic principles of liquid clarification. They are exclusively designed to eliminate maintenance problems normally associated with filtering equipment. Heavy duty construction assures efficient, long lasting, uninterrupted operation.

Henry Automatic self-cleaning filters for clarifying liquids are available in models with capacities from 20 to 1,000 G.P.M. Write today for complete information—and an answer to your filter problems.

Henry Continuous Chip and Liquid Separators

Removes machining and grinding chips or residue from coolants by both settling and flotation. It is of particular value in the machining or grinding of cast iron, steel, non-ferrous metals and plastics. Capacities to 2,000 G.P.M. available.

HENRY MANUFACTURING CO., INC.
503 E. Reed St. Bowling Green, Ohio

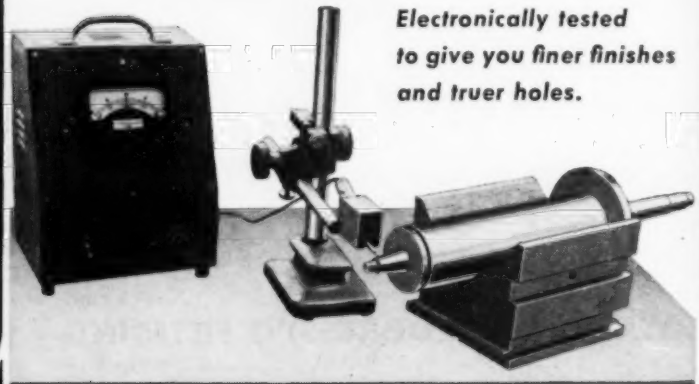


(See Number 11)

(See Number 13)

accent on Accuracy!

PRECISION Whitnon SPINDLES



Electronically tested to give you finer finishes and truer holes.

It's the accent on accuracy, too, that enables this gyroscope to keep perfect balance . . . any place . . . any time.

It's the *accent* on *accuracy*, also, that enables this dynamic electronic tester to help build perfection into every Whitnon Spindle. Measuring variations to 0.000010" it checks every Whitnon Spindle after assembly . . . to assure the absolute dependability and balance that turn your jobs out faster, more economically and more precisely.

Proven precision like this . . . plus proven Whitnon quality . . . make Whitnon Spindles your best buy for any spindle operation.

WRITE FOR LITERATURE TODAY.

SPINDLES for GRINDING · BORING · MILLING · DRILLING

THE Whitnon MANUFACTURING COMPANY
ROUTE 6 AND NEW BRITAIN AVE., FARMINGTON, CONNECTICUT

13. Surface Grinding Machine. Bulletin GM 54 covers description and specifications for the new B & S No. 510 surface grinding machine. Design features and accessories available are detailed. Specifications include: cap., grinds work 11" long, 5" wide and 12" high (with 8" diam. wheel), work to 12½" high with 7" diam. wheel; spindle speed with Oriflex drive is 2850 rpm, with direct motor drive, 3450 rpm. Brown & Sharpe Mfg. Co., Providence 1, R.I.

14. Grinding Wheels and Paper Knives are featured in issue number two of the quarterly publication, **Cutting Trends.** Two new and improved methods for manufacturing ultra precision grinding wheels for toolroom use and for the grinding of crankshafts and camshafts are described and illustrated. Also included is a special article on the correct grinding and honing procedures for sharpening paper cutting knives. Simonds Worden White, 1101 Negley Place, Dayton 7, Ohio.

15. Cut-Off Machine. Brochure covers illustrations, features and specifications on the Bullard cut-off machine, developed and formerly sold by the George H. Bullard Co. The totally-enclosed wheel feeds vertically within the rugged frame construction for maximum protection to operator. Foot pedal controls semi-automatic hydraulic operation, leaving hands free for handling stock. Specifications include: base of the machine, 24"x43, table 44" above the floor; 16" dia. x ⅛" thick cut-off wheel is standard, can accommodate up to 18". A complete stock of cut-off wheels available for all applications. Capacity—solids up to 2½" dia., squares to 1¾", angles to 4", and tubing up to 4" O.D. James Smith & Son, Inc., 982 Southbridge St., Worcester 10, Mass.

16. Gear Checker, Model 1218A, with an integrated optical system for easy and accurate checking of gear leads, is described in four-page Bulletin 1218-A. Detailed are design, construction and operation of this new concept checking instrument that eliminates gage blocks, multiple settings, micrometers, verniers and gear trains from the setup procedure. Capacities and specifications are discussed. A highlight of the bulletin is a step-by-step example, with sketches, on using the optical system. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

(See Number 15)

Please Mention GRINDING & FINISHING when writing to Advertisers

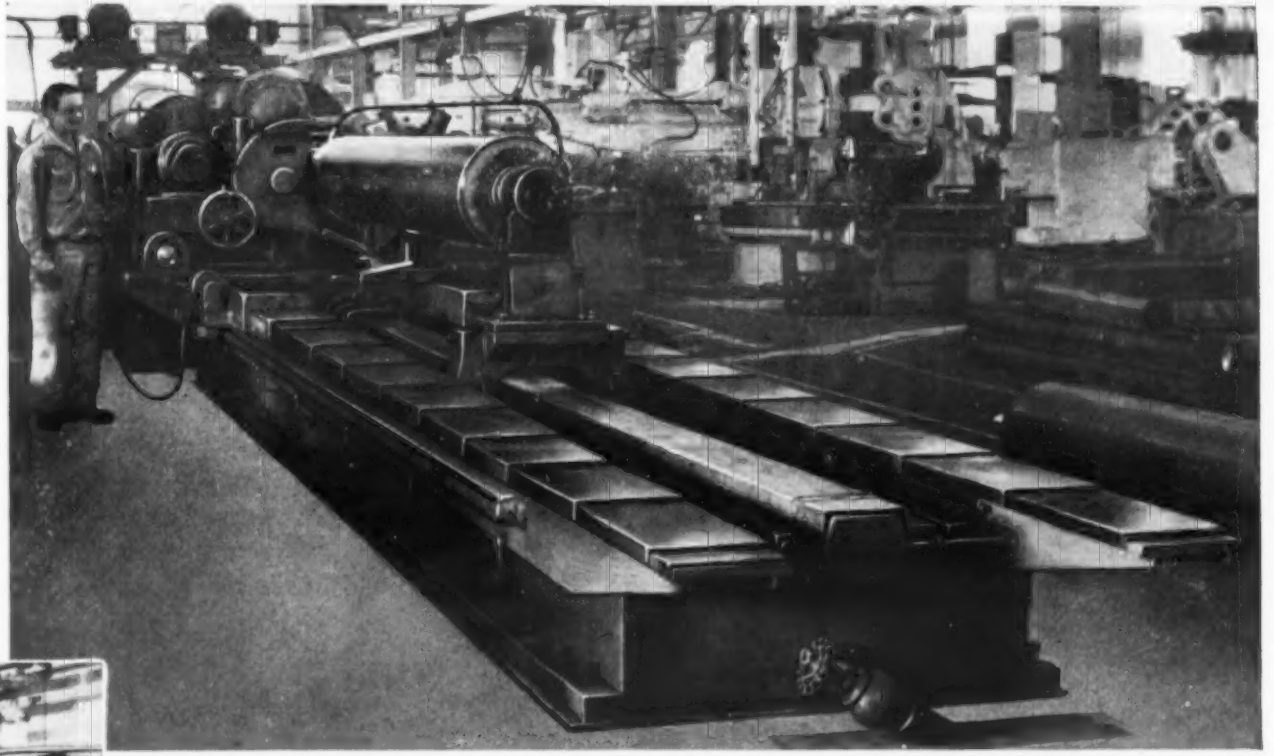
LOBDELL GRINDER

—Latest Addition to Sandy Hill's 10 Year Expansion Program

A Lobdell Roll Grinder, the most modern available, is Sandy Hill's newest acquisition in a ten year retooling program now nearing completion. It will accommodate rolls from 6 inches to 8 feet in diameter.

Sandy Hill has had long experience in studying and recommending proper crowning for rolls in each paper machine section. Now a newly designed crowning device incorporated in the new Lobdell Roll Grinder gives a full range of desirable crown curves.

An automatic wheel infeed compensates for wheel wear on chilled iron to eliminate the inaccuracies that are the most common cause of uneven caliper in the finished paper sheet.



- Massive bed and carriage construction.
- Inverted Vee-ways . . . stronger, better lubricated.
- Crowning device . . . designed to give full range of desired crown curves.
- Choice of A.C. or D.C. electrical equipment to suit your mill needs.
- Quick wheel change made easy with grinding wheel mounted on end of wheel spindle.
- Full way protection with metallic telescoping covers.
- Handwheel control on side of wheel-head permits observation of work while feeding wheel.
- Coarse and fine feed of wheel at operator's choice.
- Automatic wheel infeed to compensate for wheel wear on chilled iron.
- Self-contained wheel spindle . . . forced feed lubrication with oil pressure control.

A New LOBDELL Roll Grinder Means FASTER GRINDING

plus:
- PRECISE CROWNING
- BETTER SURFACE FINISH
- MAXIMUM ACCURACY ON BOTH IRON AND RUBBER COVERED ROLLS

UNITED
ENGINEERING AND FOUNDRY CO., 948 FORT DUQUESNE BOULEVARD, PITTSBURGH, PENNA.

For information about any advertised product see the Advertisers Index and Action Card inside back cover

wherever abrasive operations are performed

New Equipment and Materials

For further information on any of the products listed here, use the handy postpaid card opposite page 72.

Fifty-Two Foot Tubing and Bar Stock Fixture For Centerless Grinding

Designed for No. 2 and No. 3 centerless grinders, this patented fixture makes possible the grinding of from ⅛ to 12" O.D. up to 52' lengths, and holds .001 tolerance over the entire length. This fixture makes possible in most cases the removal of stock faster than a lathe by eliminating the time wasted setting steady rests. Unlimited stock removal is possible over the full length which permits users to fill special requirements of tubing or bar stock by using the next largest standard size.

The two master models are designed for 14' lengths with 12' telescopic attachments to provide fixture lengths up to 52'. The capacity of the No. 2 model (for the No. 2 centerless grinder) ranges from ⅛ to 4½" in diameter while the No. 3 range is ¾ to 12".

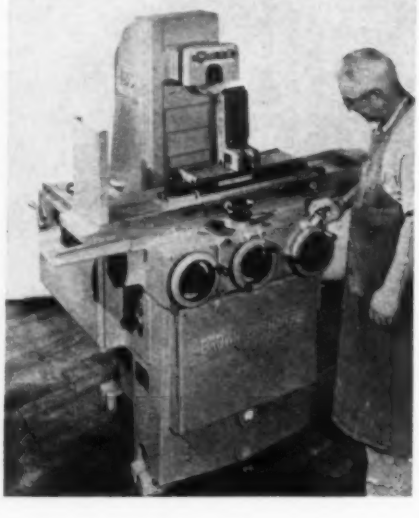
A template is provided with the fixture to simplify the drilling and tapping operations of the four holds for mounting the fixture to the end of the original thrufeed fixture of the centerless grinder. Connection and removal of the fixture is a five-minute operation.

The fixture consists of a horizontal seamless guide tube, adjustable twin cross arms with adjustable roller bearings set on a Helix angle and an adjustable telescopic upright for support of the fixture. The attachments are equipped with four cross arms each and interlock as male and female with a ⅝" tapered pin providing a secure rigid connection.

A&B Tubing and Bar Stock Fixture, Inc., in association with A&B Centerless Grinding Co., 8301 Lynch Road, Detroit 34, Mich.

Use postpaid card. Circle No. 101

Surface Grinding Machine Grinds Work to 6"x18"



The 618 Micromaster grinds work to 6" wide and 18" long. Using a full size 8" wheel with the vertical adjustment handwheel located on the bed, work to 14" high can be accommodated; with the handwheel on the upright, the maximum work height is 12".

The new Oriflex drive to the flanged type spindle provides smooth flow of power to the grinding wheel. A choice of Oriflex or direct motor drive spindles is offered. The Oriflex drive spindle (with 8" wheel) runs at 2860 rpm, while the direct motor drive spindle (with 7" wheel) runs at 3450 rpm.

The arrangement of the movable wheelslide upright mounted on a heavy cast iron base eliminates the conventional carriage, prevents table twist, and contributes to the highest degree of accurate slot and form grinding.

Dull chrome finish on the cross feed and vertical feed handwheels, and their easy-to-read graduations, reading to 0.0002", make precise adjustments of the grinding wheel easy. For extreme accuracy of vertical adjustment, an auxiliary dial, adjacent to the handwheel, gives a fine vertical feed and is graduated to read to 0.0001". This fine feed is available for the cross feed at additional cost.

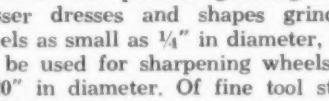
Highly accurate surface grinding of small and medium-sized work is possible with the three models available. These models are: (1) with hydraulic and hand longitudinal, and hydraulic and hand cross feeds; (2) with hydraulic and hand longitudinal, and hand cross feeds, and (3) with hand longitudinal and hand cross feeds.

Unit construction permits all machines to be assembled to the customer's requirements—over a hundred combinations of spindles, spindle drives, locations of handwheels, etc., are possible. There are various attachments available also.

Brown & Sharpe Mfg. Co., Providence 1, R.I.

Use postpaid card. Circle No. 102

Wheel Dresser Runs On Resilient Bushing



The No. 514 open side grinding wheel dresser dresses and shapes grinding wheels as small as ¼" in diameter, and can be used for sharpening wheels up to 20" in diameter. Of fine tool steel, the lightweight dresser runs on a resilient bushing. A shock-absorbing bearing is said to keep the cutters running smooth and true until worn out.

Because of the dresser's fast-cutting action, it is possible to shape grinding wheels to various contours. The manufacturer also reports that it will operate on the sides of wheels close up to the arbor collars.

No. 514 dresser, complete, $2.95; resilient bearing extra cutter, .45c.

Thompson Sales Co., P.O. Box 983, Erie, Pa.

Use postpaid card. Circle No. 103

Buffs in Demonstration Kit

A demonstrator kit, carried by all American Buff Co. representatives, offers eight different types of buffs (with six different treatments). These treat-

ments are available on bias cloth, unit cloth (sewed or unsewed), pleated cloth, bias sisal, unit sisal, open bias sisal, and uniflex abrasive buffs in centerless and permanent center construction to fit every plant's equipment.

American Buff Co., 2414 S. LaSalle St., Chicago 16, Ill.

Use postpaid card. Circle No. 104

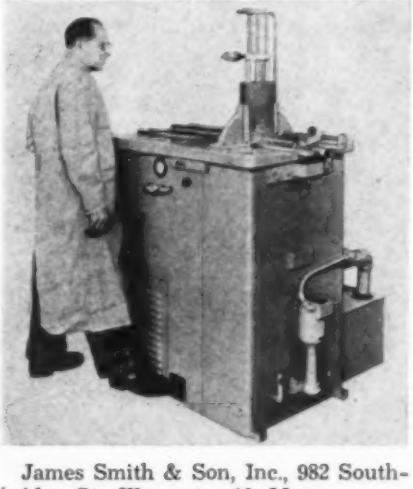
Cut-Off Machine Is Safe By Entirely Enclosing Wheel

The Bullard cut-off machine, developed and formerly sold by the George H. Bullard Co., is now being manufactured and marketed by James Smith & Son, Inc. The machine has totally enclosed wheel which feeds vertically within the rugged frame construction, for maximum protection to operator and others near by. Wheel feeding and work clamping are semi-automatic. Hydraulic control is achieved by a single foot valve, thus leaving both hands free for handling stock.

Cutting is fast, up to two seconds per square inch, depending on the material, the manufacturer claims.

Metal and carbide tipped saws may be interchanged with abrasive wheels for some softer materials.

Specifications include: base of the machine, 24" x 43", table 44" above the floor; 16" dia. x ⅛" thick cut-off wheel is standard, can accommodate up to 18". A complete stock of cut-off wheels is available for all applications. Solids up to 2½" dia., squares to 1¾", angles to 4", and tubing to 4" O.D. may be cut.



James Smith & Son, Inc., 982 Southbridge St., Worcester 10, Mass.

Use postpaid card. Circle No. 105

FAST . . . ECONOMICAL . . . VERSATILE . . .

ENGELBERG

Multiple-Head, Conveyorized Abrasive Belt Grinders

TWO-HEAD GRINDER For two operations in one pass.

FOUR-HEAD GRINDER Finishes four operations in one-fourth the time.

SIX-HEAD GRINDER Performs six operations in a single pass.

Pioneered and developed by Engelberg, the multiple-head, conveyor-type abrasive belt grinder is the modern production method of stock removal and finishing. Machines are available with from one to six or more heads.

From rough grind to final polish in a single through-feed pass the Engelberg groups finishing, sizing and polishing operations which might otherwise require several machines and operators.

Parts can be conveyorized or hopper-fed to machine's conveyor belt, and automatically ejected. Minimum set-up and change-over time add production dividends in both short and long run operations.

Whatever your grinding need, you'll find an Engelberg machine to fit it.

Send for your copy of this

FREE BOOK

"How Abrasive Belt Grinding Increases Production at Lower Cost."

THE ENGELBERG HULLER CO., INC.

182 Seneca St., Syracuse, N. Y.

Precision ABRASIVE BELT GRINDERS

WHY MICROHONING* OF GUIDE PIN BUSHINGS ASSURES FUNCTIONAL PRECISION, LONGER LIFE, LOWER COSTS

Lamina Dies and Tools, Inc., a pioneer in the development of bronze-plated guide pin bushings (bronze is electroplated on hardened steel for combined strength and smoother action), required a processing method that would economically produce bushing bores having dimensional precision, accurate geometry, functional surface characteristics, and consistent duplication to exacting specifications in every bushing.

In developing processing methods for the bushing bores, Lamina engineers found that Microhoning is best for generating final precision and functional surface characteristics at lowest cost per bushing.

Bronze, bronze-plated or steel bushings from ¾" to 4½" in diameter are Microhoned on this Hydrohoner. Stock removal is from .001" to .003" and average unit cycle is 30 seconds. Machine is equipped with automatic size control and tool expansion.

Characteristic cross-hatch lay pattern

Why? Because Microhoning generates a round, straight cylinder along the neutral axis of the bore; size and geometry of bushings up to 2½" in diameter are held to .0001" tolerances; contact area between bushing and guide pin is 25% greater than obtainable by other final processing methods. In addition, the characteristic cross-hatch lay pattern generated by Microhoning provides a "built-in" lubrication system in each bushing bore. This combined with the clean-cut surface prevents seizure or scuffing during operation of bushing. Finally, the self-dressing action of Microhoning abrasives assures continuous cutting efficiency and identical geometry, dimensions and surface finish in every bushing bore.

Thus, Lamina realizes, through Microhoning's generation of quality surfaces and precision bores, the full performance potential of bronze, bronze-plated or steel guide pin bushings—longer life, smoother action, lower costs.

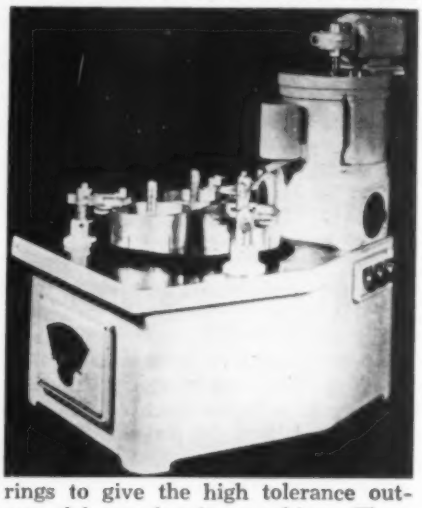
Learn how Microhoning provides efficient stock removal, closer tolerances and functional surfaces—SEND FOR FREE LITERATURE.

**Registered U.S. Patent Office*

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

Compact Lapping Machine Has Big Machine Operation

The bench model Gyro-Matic 12" flat lapping machine operates with Spitfire's exclusive work holder retainer



rings to give the high tolerance output of larger lapping machines. These rings reportedly permit a constant rotating movement which produces a truing action to keep the lapping surface completely flat.

Pushbutton operation automatically controls most details while eliminating parts measurement and testing.

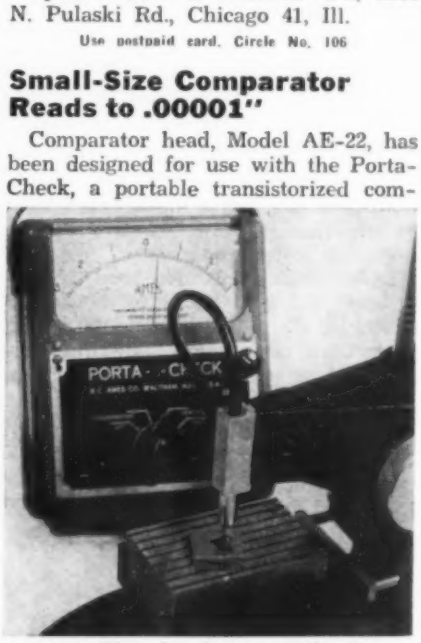
A selector allows easy selection for correct abrasive flow.

Spitfire Tool & Machine Co., 2931 N. Pulaski Rd., Chicago 41, Ill.

Use postpaid card. Circle No. 106

Small-Size Comparator Reads to .00001"

Comparator head, Model AE-22, has been designed for use with the Porta-Check, a portable transistorized com-



parator. This head reportedly has a measuring range of .006" on the thousandths scale and .0006" on the tenths scale. When used with the portable unit, the small-but-rugged comparator is said to read to .00001". Both units are readily connected to each other.

B. C. Ames Co., Waltham, Mass.

Use postpaid card. Circle No. 107

Grease Stick for Metal Finishing Uses

The development of a grease stick, G. S.-7205, is a combination of light-bodied greases that will spread easily

on the abrasive belt or wheel, prevent logging or clogging, and prolong the time efficiency of each, the manufacturer claims. It is particularly recommended for slow moving belts or wheels, where there is not enough surface feet per minute to melt conventional type greases.

Schaffner Mfg. Co., Inc., Schaffner Center, Pittsburgh 2, Pa.

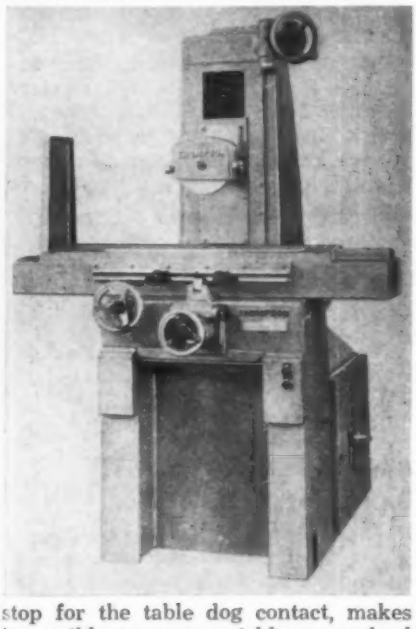
Use postpaid card. Circle No. 108

Hand Feed Surface Grinder Has Work Area of 6"x14"x18"

Combining ruggedness and great rigidity with super sensitivity and easy operation, the Type D hand feed surface grinder is designed for general toolroom grinding with special features said to assure an extremely close tolerance work on carbide and other hard metals.

Vertical capacity has been increased to a standard 14" under a 7" wheel at no extra cost and with no loss in vertical capacity when using wet attachment, making the total work area of this new machine 6" wide x 14" high x 18" long. To assure closer tolerance work, the bearing quill is supported solidly through its entire length and to increase the rigidity of the mounting of the various movable elements, all anti-friction slides are equipped with steel rollers which also eliminate all possibility of ball creep.

A 5" table movement per one turn of the hand wheel speeds the work and improves the quality of the finish grind while no-backlash, anti-friction ball nuts and screws incorporated in the cross feed reportedly eliminate any possibility of the wheel creeping away from the work in shoulder grinding. A new stop dog arrangement, consisting of a casting anchored securely to the table, with a new swing-out type of



stop for the table dog contact, makes it possible to move quickly to a wheel dresser and to return to the initial stop position.

The Thompson Grinder Co., 1534 W. Main, Springfield, Ohio.

Use postpaid card. Circle No. 109

HOW MICROHONING* OF GUIDE PIN BUSHINGS PROVIDES FUNCTIONAL PRECISION, LONGER LIFE, LOWER COSTS

HERE'S HOW Lamina Dies and Tools, Inc. uses Microhoning to generate final precision and functional surface characteristics in bushing bores at minimum cost.

Microhoning's low-velocity, controlled abrading technique removes a minimum of the bronze plating to obtain accuracy and functional surface characteristics. Thus, as much as possible of bronze plating is conserved and a uniform thickness of bronze throughout the bore is assured.

Above is a typical Lamina guide pin bushing. These bushings range in diameter from ¾" to 4½". An air operated, three-jaw fixture rigidly holds the work piece and is easily adapted to bushings of any size.

Because Microhoning tools have universal joints, they follow the neutral axis of the bore in generating round, straight cylinders. Since the bore location remains unchanged, concentricity between bushing I.D. and O.D. is obtained.

The combined reciprocating and rotating motions of the Microhoning tool creates on the bore surface a cross-hatch lay pattern that functions as a "built-in" lubricating system. For, the multitude of minute, diamond-shaped plateaus—over which the load is evenly distributed—are separated by a network of valleys that holds the lubricant. This better method of lubrication plus the clean-cut Microhoned surface prevent seizure or scuffing of bronze, bronze-plated and steel bushings. And, the self-dressing action of Microhoning abrasives maintains cutting efficiency to assure the same surface finish is developed in every bushing bore.

Learn how Microhoning provides efficient stock removal, closer tolerances and functional surfaces—SEND FOR FREE LITERATURE.

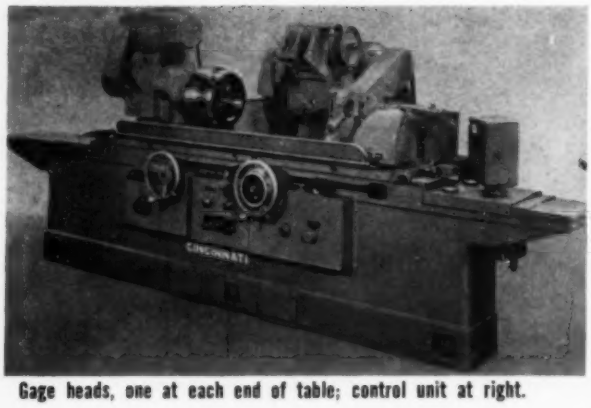
*Registered U.S. Patent Office

MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

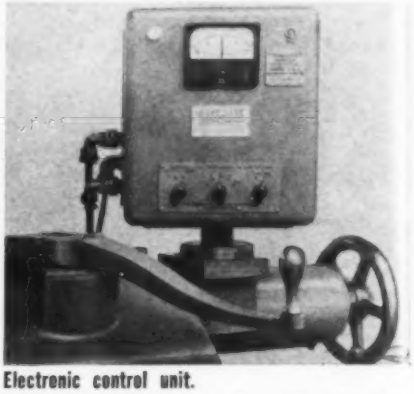
Taper Correcting Attachment

The Gage-Line taper correcting attachment, applicable to Cincinnati Filmatic centertype grinders up to 48" length, can be applied to the company's 4" to 14" plain grinders, and all sizes of their universal grinders. It is employed primarily to obtain exact alignment of the swivel table, thereby eliminating uncertain cut-and-try methods when grinding the work to precise accuracy of straightness.



Gage heads, one at each end of table; control unit at right.

The attachment consists of two independent gage heads, one mounted on each end of the swivel table, and an electronic control unit mounted on the bed or some other part of the machine, convenient for the operator. When the swivel table is adjusted, the control unit electronically translates the signal from each gage head to a graduated meter reading direct for amount of movement and length of workpiece. The meter is selective for a high and low range totaling .020" and .002" respectively. Electrical switches on the control unit select the range of work length, magnitude of adjustment, and the signal from the right or left hand gage head.



Electronic control unit.

Grinding Machine Div., The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

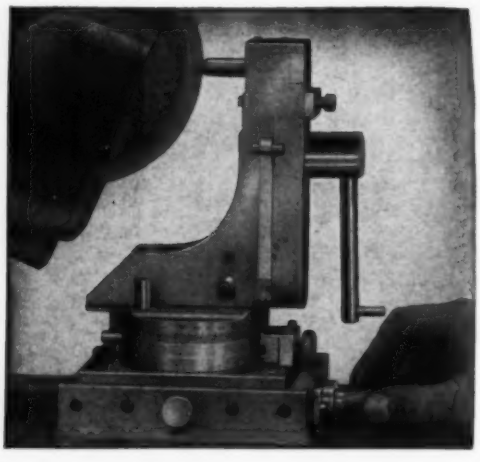
Use postpaid card. Circle No. 110

Tough Grinding Wheel Forms Dressed Easy as A, B, C

eliminate elaborate set-ups and operations

.0001" ACCURACY

Fluidmotion
WHEEL DRESSERS
dress two angles tangent to a radius in one continuous motion



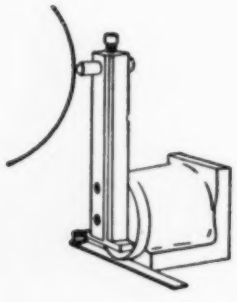
With the unique "Fluidmotion" Dresser, you can dress two angles tangent to a radius — using one handle in one continuous motion. Operation is so fast and simple that beginners can use them.

Adaptable to all type cylindrical and surface grinders.

A. Obtain micrometer reading; add required convex radius or subtract required concave radius.

B. Loosen jib with wrench and "mike" over lower pins to reading obtained above.

C. Tighten jib. Set stops for two angles. Ready for action.



Also available: "FORM MASTER" Dresser, capable of dressing any radii up to 12" convex, up to 15" concave.

See your industrial distributor or write for free literature.

J&S TOOL CO., INC. — CLAMPCUT

J & S TOOL CO., INC.
880 DORSA AVE.
LIVINGSTON, NEW JERSEY

Heavy-Duty Pneumatic Tool For Hard-to-Reach Areas

A heavy-duty pneumatic tool with long extension is said to facilitate reaching formerly inaccessible areas in deep dies, castings, and forgings, and also permits two-handed operation for heavy-duty grinding. This Model 2EL5 tool is similar in general design to the company's Model 2GL grinder.

Pneumatic tool with handy lever control.

The manufacturer stresses the advantages of the tool's four-vane rotary air motor design over turbine-type and electrically driven tools. In addition to positive starting, the design is claimed to give higher torque and horsepower output in a more compact, lighter weight unit.

Cool, vibration-free power is provided with a speed of 24,000 rpm, with reserve power for high speeds under heavy loads.

The tool is equipped with Erickson 200 Series precision collets as standard, which takes shanks from 1/8" to 3/8".

Doeden Tool Corp., Sherwood, Ohio.

Use postpaid card. Circle No. 111

Grinder Rids Cause of Noise In Spiral Bevel Gearing

This relief grinder relieves heel and toe ends of the teeth of hardened gears to eliminate stress concentration and causes of noise. The driver-locator revolves continuously at a slow speed. The gear is simply placed on the driver-locator. Three pins in the latter register with mounting holes in the gear. No clamping is necessary.

The grinding spindles are located horizontally in the upper part of the machine column. During grinding, the wheels rock in and out of contact with each tooth in turn, following the contour of the tooth. In this machine, one revolution of the work thus completes the relieving of all teeth.

Time cycle for relieving all teeth of a 43-tooth ring gear is approximately 45 seconds. The machine is also available in two- or three-station models. All of these grinders will handle ring gears from approximately 6" to 10" outside diameter.

The grinder also has a tilting work head movement to place the workpiece in proper position. For loading and unloading, the grinding wheels automatically retract to avoid interference with the work.

The grinder has dual safety start button. The rocking table automatically returns to loading position when the cycle is completed.

Modern Industrial Engineering Co., 14230 Birwood, Detroit 38, Mich.
Use postpaid card. Circle No. 112

Diamond Cut-Off Wheel

The R-805 free cutting diamond cut-off wheel is specifically designed for dry cutting of reinforced plastics. The many glass or alumina filled epoxies that have a dulling effect on hardened steel or carbide tipped saws are said to be efficiently cut and machined with this diamond saw.

Diamond core drills, reamers, countersinks and chamfering tools, made with the same free cutting principle, are also available.

Sample Marshall Laboratories, Inc., 63 Park Ave., Lyndhurst, N.J.
Use postpaid card. Circle No. 113

Heavy-Duty Drill Grinder Extends Drill Size Range

A heavier-duty model has been added to Oliver's No. 21 drill pointer line to permit extension of drill size range for the Oliver point which, until now, has been available only on the Oliver No. 510 drill pointer. This latter machine has a maximum capacity of 3" in diameter. This Oliver drill grinding technique permits a more intensive clearance angle on the point as the drill web is approached.

While basically the same as its standard companion, the new model uses ball bearings in conjunction with a special, cam-operated stud. This controls horizontal motion as the drill moves across the grinding wheel face to produce the desired point.

Capacity of the machine is identical with the standard model, 3/32" to ½". Included as standard equipment is the ¼ hp motor, grinding wheel, diamond dresser, jaw assemblies and setting gauge.

Oliver Instrument Co., 1442 E. Maumee St., Adrian, Mich.
Use postpaid card. Circle No. 114

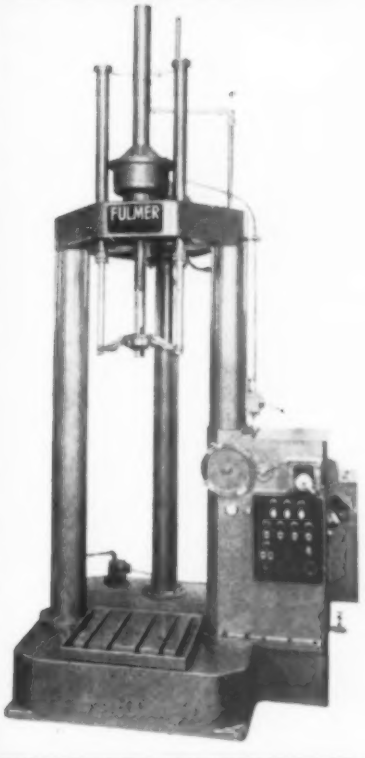
COST CONSCIOUS?

new FULMER Honing Machines COST LESS

. . . To Purchase

. . . Install . . . Operate

. . . Maintain . . . Modify



Fulmer Honing Machines are better designed for accurate performance . . . better constructed for years of economical operation . . . None more flexible or easily modified. All This—And never a charge for Service!

Cost conscious customers—call FULMER

C. ALLEN FULMER CO.

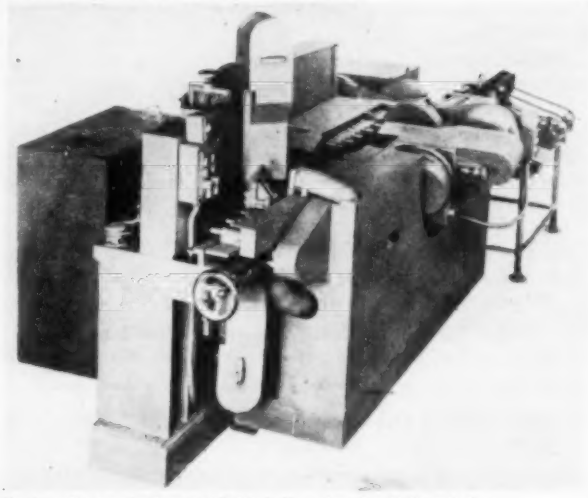
Room 29-A • 107 E. Fourth St.
Cincinnati 2, Ohio • MA 1-4683

FULMER

WORLD'S BEST Honing Machines

Compact Dust Collector Used With Grinder Handles 1400 Cu. Ft. of Air Per Minute

The Dustkop Model 1150 is particularly suited to multiple operations where dust volume is high and shop space is at a premium. Using the cyclone principle of separation, the compact unit handles 1400 cu. ft. of air per minute with a 1½ hp motor. A special fiberglass filter removes all particles down to and including 0.5 micron size. No dust settles into working parts.



Dust collector is located behind the abrasive belt grinder.

The straight line grinding and de-burring machine shown is used for the grinding and finishing of typewriter tab and margin racks, performing operations that formerly involved six different machines. It is reported responsible for an annual saving of 8000 man-hours. Part of the credit for this saving goes to the air-recirculating dust collector.

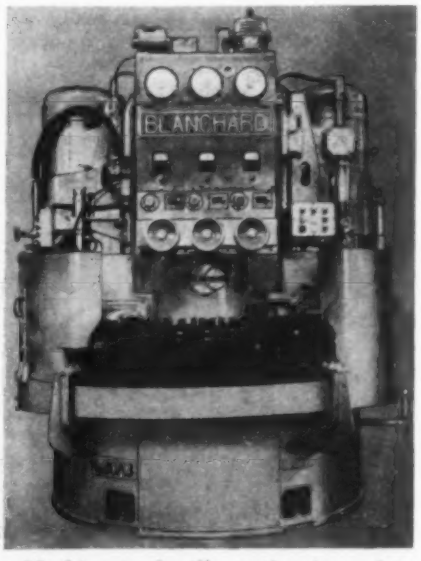
There are 37 standard models of the dust collectors, ranging in capacity from 300 to 10,050 cfm.

Aget Manufacturing Co., Adrian, Mich.

Use postpaid card. Circle No. 115

Center Column Grinder Has 80" O.D. Work Table

The Blanchard 80-A3 is a center column automatic surface grinder with 48" I.D. x 80" O.D. work table and three grinding wheel spindles. A finger-type feed control caliper maintains each wheel at correct height. Since the work table is nonmagnetic, all parts are held in fixtures during the grinding cycle.



Machine in the illustration is used to rough grind both sides of both ends of automotive connecting rods.

Specifications include: motors—25, 30 or 40 hp each spindle, 3 hp table; floor space—7'8" x 8'2"; feed—manual or power.

The Blanchard Machine Co., 64 State St., Cambridge, Mass.

Use postpaid card. Circle No. 116

Diamond Abrasive Mfg. Process Provides Better Wheel Cutting

The Diamond Tool Research Co., Inc. has developed a new process for manufacturing diamond abrasives whereby extreme pressures are used to break the diamond fragments into sound blocky grits. Slivers, flats and pieces with severe internal stresses are subjected to a pressure that breaks them again and again until only sturdy diamond grains result. The general shape of these abrasive grains is blocky and the cutting edges have not been rounded, as rounded grains cause frictional heat from rubbing.

Called Pressure Tested, these grits are used in resinoid and metal bonded diamond wheels, saw blades, mining bits, as loose abrasives in graded sizes, and in diamond compound.

It is reported that cutting action of

GRIND...POLISH...DEBURR in one operation with Hammond FLAT FINISHERS

For fast, uniform, economical finishing of flat work such as sheets, bars, strips, stampings and extrusions with one machine, one operator and one pass.

AUTOMATIC AIR TENSIONING: maintains correct tension on abrasive belts and conveyor belt • **VARIABLE SPEED CONVEYOR:** rate of feed is adjustable from 0 to 60 FPM • **WORK HOLDERS:** hold-down rolls, electro-magnetic platen and various types of conveyor belts • **AMMETER CONTROL:** an ammeter for each head allows operator to determine and maintain the polishing pressure necessary for a uniform finish and longer belt life • **V-BELT DRIVE:** allows abrasive belt speed to be changed to suit the work • **MICROMETER DIAL:** controls heads for required depth of cut.

Write for literature today.

1 TO 6 HEADS
6" to 12" WIDE

Hammond Flat Finishers are available in 6", 8", 10" and 12" widths — handle work up to 6" high.

SEND SAMPLES
Send us one finished and several rough samples. You will receive a complete Engineering Report and Production Analysis without obligation.

Hammond Machinery Builders INC.
1651 DOUGLAS AVE. • KALAMAZOO, MICHIGAN

the diamond wheels is smoother, faster, with more pieces cut—provided by the consistent shape and quality of the grits.

The Diamond Tool Research Co., Inc., 380 Second Ave., New York, N.Y.

Use postpaid card. Circle No. 117

Time-Saving Belting

Downtime on machines due to belting replacement can be cut to a few minutes by a pre-stretched polyamide plastic belting, the manufacturer claims. The Dixylon belting can be made endless on the job in a few minutes without fasteners or sewing.

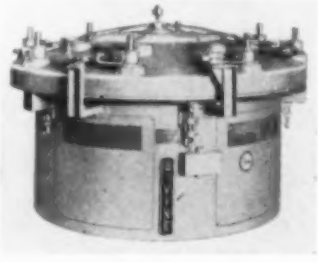
The belting comes in all standard widths and thicknesses for applications such as transmission, conveying, heavy drives, and high-speed drives. It will find wide use in the textile, paper, printing, packaging, woodworking, and machine tool industries.

R. & J. Dick Co., Inc., Totowa, N.J.

Use postpaid card. Circle No. 118

Rotary Conveyor For Polishing Head Units

The RV-X indexing type rotary conveyor, for polishing head units, consists of a 72" diameter table containing eight fixture spindles on a 66" diameter centerline. The height from the floor to the top of the fixture spindle is



42" maximum. Drive units are readily accessible through doors in the base.

The dial plate is made of cast magnesium for lightness and is accurately machined to receive fixture spindle assemblies.

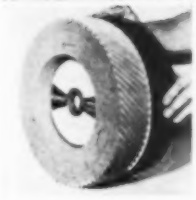
Drive is from 1½ hp motor through a magnetic clutch and brake unit, through gear reduction and through an intermittent motion for indexing the dial. The indexing rate is controlled by an automatic timer, providing a variable range of indexes per hour.

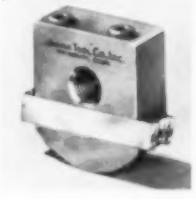
The fixture spindle drive for use on medium to heavy work consists of individual gearhead motors, usually powered by direct current. This makes possible the rapid selection of needed fixture spindle speed by merely turning a selector knob in the pushbutton panel.

Two fixture spindles are always in the loading station and these spindles are idle (not rotating) for unloading and reloading. Dial index rate was given as 120 to 1000 per hour, fixture spindle speed as 12 to 100 rpm, and fixture spindles as being 1½" diameter x 3".

Divine Brothers Co., Utica, N.Y.

Use postpaid card. Circle No. 119





Thread Plug Gages. The Black Diamond thread plug gages are said to have increased resistance to wear and abrasion. They are priced the same as standard steel. Now all Threadwell thread plug gages from No. 0 through 1½" reportedly have incredible hardness thru a new surface treatment. Threadwell Tap & Die Co., Greenfield, Mass.

Use postpaid card. Circle No. 120

Expanding Grinding and Polishing Wheel, made of rubber and using coated abrasive bands is said to eliminate the need for backstand-idlers in the use of coated abrasives. These wheels, offered as replacements for contact wheels, set-up wheels, and bonded grinding wheels, display a superior cutting power, the manufacturer claims. Mermac Products, Inc., 1144 S. Kostner, Chicago 24, Ill.

Use postpaid card. Circle No. 121

Tool Bit Holder. The Somma Kwik-Form tool bit holder, designed for fast setups in short runs, screws right onto the tool post. It is not necessary to remove the circular form tool post when using tool bits on short runs. No need for special tools—simply hand or surface grind form into standard H.S. or carbide tool bit; or even circular grind, using holder as fixture. Somma Tool Co., 109 Scott Rd., Waterbury, Conn.

Use postpaid card. Circle No. 122

HOW TO CUT
SET-UP TIME
WITH
Sundstrand
Magnetic Chucks

Here are two more examples of the profitable application of Sundstrand magnetic chucks to grinding operations. Similar, profitable applications have been made to milling jobs.

No matter how you are holding work pieces now, in grinding and milling, talk to a Sundstrand engineer. There is no obligation for this service.

SET-UP TIME CUT 30%

12"x96" transverse pole magnetic table on vertical spindle grinder holds various sizes of H.S.S. broaching tools at an average savings in set-up time of 30% over former method.

SET-UP TIME CUT 20%

Four 10"x40" POWER-GRIP Chucks on a 24"x96" horizontal spindle surface grinder hold ways, way caps, valve plates, broach holders etc. The four chucks can be operated individually or as one complete unit. Set-up time averages 20% less than previous method.

GET MORE FACTS

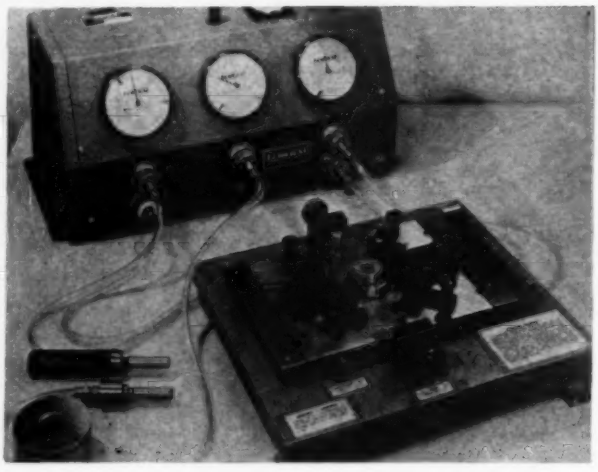
Write for further information on holding work for both grinding and milling operations. Bulletin 399M

SUNDSTRAND

POWER-GRIP

SUNDSTRAND-American BROACH
DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

Extremely Accurate Assembly Through Gaging Techniques



This high-magnification positioning indicator, A-205 B-44, shows how gaging techniques can be adapted to other precision requirements in the manufacture of precise, close-tolerance components.

The precise positioning of parts to permit extremely accurate assembly of end plates and cylinder of a guided missile flight control actuator is accomplished with a triple unit Dimensionair air gage and a specially designed fixture. This instrument permits the end plate bearing diameters to be positioned so that the vaned rotor will maintain .0003" (±.0001") clearance with the cylinder wall throughout 150° arc of travel.

The gage is first mastered by placing a stepped master setting ring on a dual air plug located on the fixture. A portable single jet air plug is then inserted into the master ring and fine adjustment screws permit moving the reference plate until the master is centered in two planes. The final position is achieved when the center air gage meter reads zero in each of four positions 90° apart. Adjustable dials on the outer meters (connected to the fixed dual air plug) are then zeroed.

After the master ring is removed, the workpiece cylinder is placed on the fixed air plug and its position adjusted so that both outer dials are again reading zero. An end plate is then placed on the cylinder and roughly positioned by inserting a fixed taper plug. After removing the fixed plug, the portable single jet air plug is placed in the hole to sweep the bearing diameter of the end plate. Radically-located fine-adjustment screws are used to position the reference plate until the sweep of the air plug causes no perceptible variation of the hand on the center air gage dial. Bolts are then inserted and tightened so the assembly can be removed and holes drilled for locating pins.

Federal Products Corp., 1144 Eddy St., Providence 1, R.I.

Use postpaid card. Circle No. 123

"most used grinder" say customers

WET or DRY Model MG

In checking with the tool, die, gage and general production shops that use SANFORD SURFACE GRINDERS, the most frequent comment was that Sanford Grinders were the "most used" of any grinders in the shop.

PARTIAL SPECIFICATIONS—

Capacity — 8" x 12" x 12".
Table travel — 13", traverse 8¾".
Vertical clearance 12" under 7" wheel.
Standard grinding wheel — 7" x ½", 1¼" hole.
Spindle speed approx. 3000 RPM.
Motor, ½ HP, single or 3 ph., dynamically balanced.
Floor space — 45" x 38" x 62" high.
Net wt. with stand approx. 630 lbs.

Others have tried to copy but there's a "feel" that comes from the precise individual quality and workmanship that goes into every SANFORD GRINDER. It's the factor that can't be found in any other grinder.

So widely used you can ask users in your own area how they like the low priced Sanford Surface Grinder.

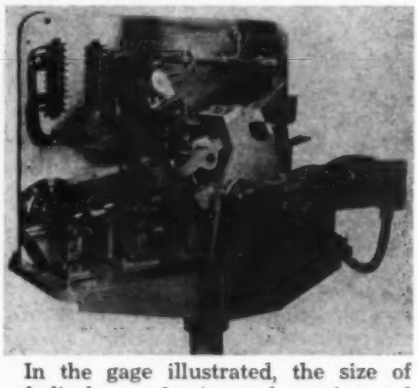
Write for illustrated and fully descriptive literature, reconditioning facilities, optional equipment and prices.

Representatives in major industrial areas

SANFORD MANUFACTURING CORP. 1026G Commerce Ave., Union, N. J.

Machine Checks Gears With Large Integral Flanges

A Red Ring automatic gear gaging and sorting machine checks accuracy of gears having large integral flanges, which cannot be fed through conventional feed chutes.



In the gage illustrated, the size of a helical gear having a large integral flange is checked automatically. One gear at a time rolls into mesh with a lower master gear that raises the gear for the precision electronic size checking operation. The upper master gear squares up the gear as it passes between the master gears.

The amount of deflection of the upper master gear is accurately measured as the gear passes through to determine the size of the gear teeth. Gears of correct tooth size pass into the gage exit, while over- or undersized gears are removed through trap doors.

An overload clutch in the motor drive for the lower master gear automatically corrects any mis-mesh on initial contact.

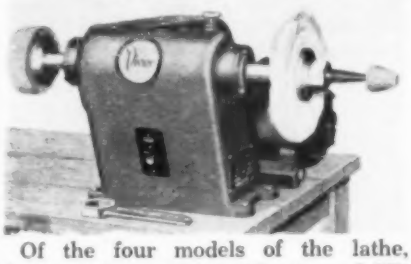
National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

Use postpaid card. Circle No. 124

Bench Lathe For Abrasive Belt Polishing

The VR bench lathe can perform abrasive belt polishing. In fact, it is

backstand units. The unit is designed for mounting either on a bench or on the Divine LP Pedestal, which is dimensioned to provide correct spindle height for average use. It is furnished with holes for lagging to floor and bolting lathe to the top surface.



Of the four models of the lathe, three of them—VR 1, VR 1½ and VR 2—are equipped with a single V-belt drive, while Model VR 3 is driven by two V-belts. V-belt drives on all models are enclosed by a metal guard. There is a wide selection of speeds and simplified maintenance. Numerous spindle arrangements are also possible.

Any of the following speeds may be selected for all the models—1600, 1800, 2000, 2200, 2400, 2600, 2800, 3100, 3600, and 4000 rpm.

Two and three speed drive can be supplied for a slight additional charge. Thus, two speeds may be selected for the VR 3 in combinations of 1800 and 2400, 1800 and 3000, 2400 and 3000, 2400 and 3600, or 3000 and 3600 rpm.

Three speeds may be selected only in combinations of 1800, 2400, 3000 rpm or 2400, 3000, 3600 rpm for the VR 1, VR 1½ and VR 2 bench lathes.

Divine Brothers Co., Seward Ave., Utica, N.Y.

Use postpaid card. Circle No. 125

Coated Abrasive Paper In New Grits and Forms

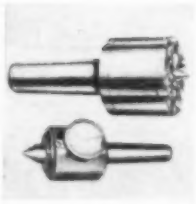
Armour's No Load coated abrasive paper, now available in several new grits and forms, can be used in a dry sanding operation. As the name indicates, there is a special non-loading coating applied to this paper which prevents loading or clogging of the abrasive grain. It is also highly resistant to moisture and will not contaminate surfaces.

The coated abrasive paper is available as follows: Finishing paper—silicon carbide "A" weight paper, grits 500 through 80, heat-treated Garnet "A" weight paper, grits 280 through 180; regular paper—silicon carbide "C" weight paper, grits 180, 150, 120 and 100, aluminum oxide "D" weight paper, grits 80 and 60; sizes and forms—sheets (full size 9x11 inch, and cut size), discs (sizes which can be cut from 9x11 inch sheet), and rolls (50 yard lengths).

In addition to being used on all types of metal surfaces, the paper can be used to sand and polish wood, ceramics, rubber, glass, mirrors, masonite.

Armour Coated Abrasives Division, Armour and Co., Alliance, Ohio.

Use postpaid card. Circle No. 126



Tool Driving Center and Live Center. The hydro-mechanical driving center is made with hydraulically controlled driving pins. This control is said to provide a 100% grip of pins on material, and will balance surface irregularities up to ¼". There are interchangeable driving pins in eight different sizes for clamping of material from 1" to 10" in dia. with but one driving center. The Compensator live center has a built-in pressure gage to provide constant visual indication of the exact amount of axial load on the center. Use of the gage prevents the live center from being overloaded as it compensates for heat expansion of the driving center. R. B. Tool Co., Inc., 17 Roff Ave., Palisades Park, N.J.

Use postpaid card. Circle No. 127

Diamond Coiled Bandsaw Blade (section shown) is designed for cut-off of plastics, ceramics, Mycalex, carbides (either fired or green), glass, or glass reinforced materials. The diamond is in continuous layer on edge, and 1/16" down sides in 100 plus concentration, electroformed nickel bond. Recommended speeds, 2500 sfm. The blades are available in 5' lengths (½" wide). Supplied to customer specifications. ¼" and ⅜" widths available on request. Priced at $40.00 per foot. Sample Marshall Laboratories, Inc., 63 Park Ave., Lyndhurst, N.J.

Use postpaid card. Circle No. 128

Bill Lenkeit tells why his Jig Boring and Jig Grinding Room is "all-Moore"

This is another in a series featuring the views of owners of leading contract tool and die companies

by **WILLIAM LENKEIT**
President
Lenkeit Machine & Tool Co., Inc.
Farmingdale, L. I., N. Y.
Precision Tooling, Contract Jig Boring and Jig Grinding

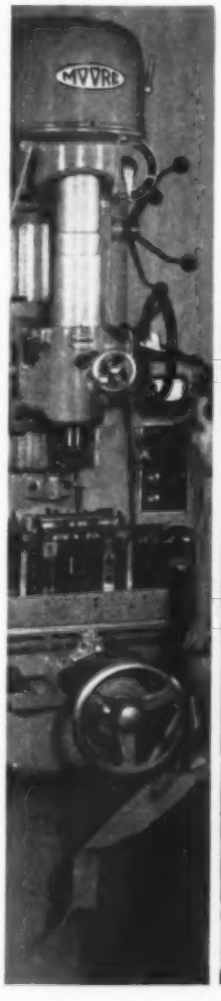
"Like other modern contract plants where close-tolerance work is the rule, we have a special air-conditioned room housing our jig borers and jig grinders. In ours, the nameplate on every machine reads 'Moore.'

"We have always sought to obtain the best possible equipment for each type of operation. That is why our facilities list includes outstanding machines of Swiss and German manufacture, as well as fine American-made equipment. But when it came to jig boring and jig grinding, we found there was no equal to Moore machines for built-in accuracy, versatility and ruggedness.

"We now have three Moore jig borers and one Moore jig grinder, with another borer on order. We use this equipment extensively for operations on the precision dies, jigs, fixtures and inspection gages we build for leading Eastern companies in the instrument, electronics, electrical and printed-circuits fields. We also do a considerable amount of contract jig boring and jig grinding for instrument companies which naturally have close-tolerance requirements.

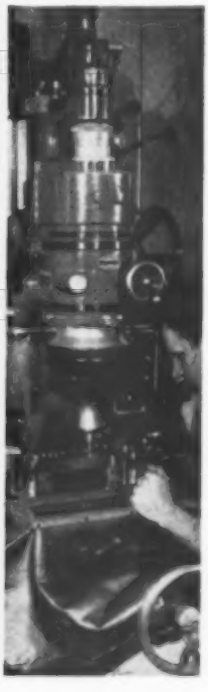
"What do we like best about our Moore equipment? These machines are ideally suited to our day-to-day toolroom work—quick setups, convenient controls and, most important of all, unmatched accuracy. Our machines have been in almost constant use since they were installed and they are just as reliable as ever.

"Our all-Moore facilities for jig boring and jig grinding are a major reason why we can say: 'It pays to tool it right at Lenkeit'."



"One of the three Moore jig borers in our air-conditioned room. They carry the load on our critical spotting, boring, drilling, reaming and checking operations."

"Our Moore jig grinder is one of the key machines in our plant. We especially like its slot-grinding ability."

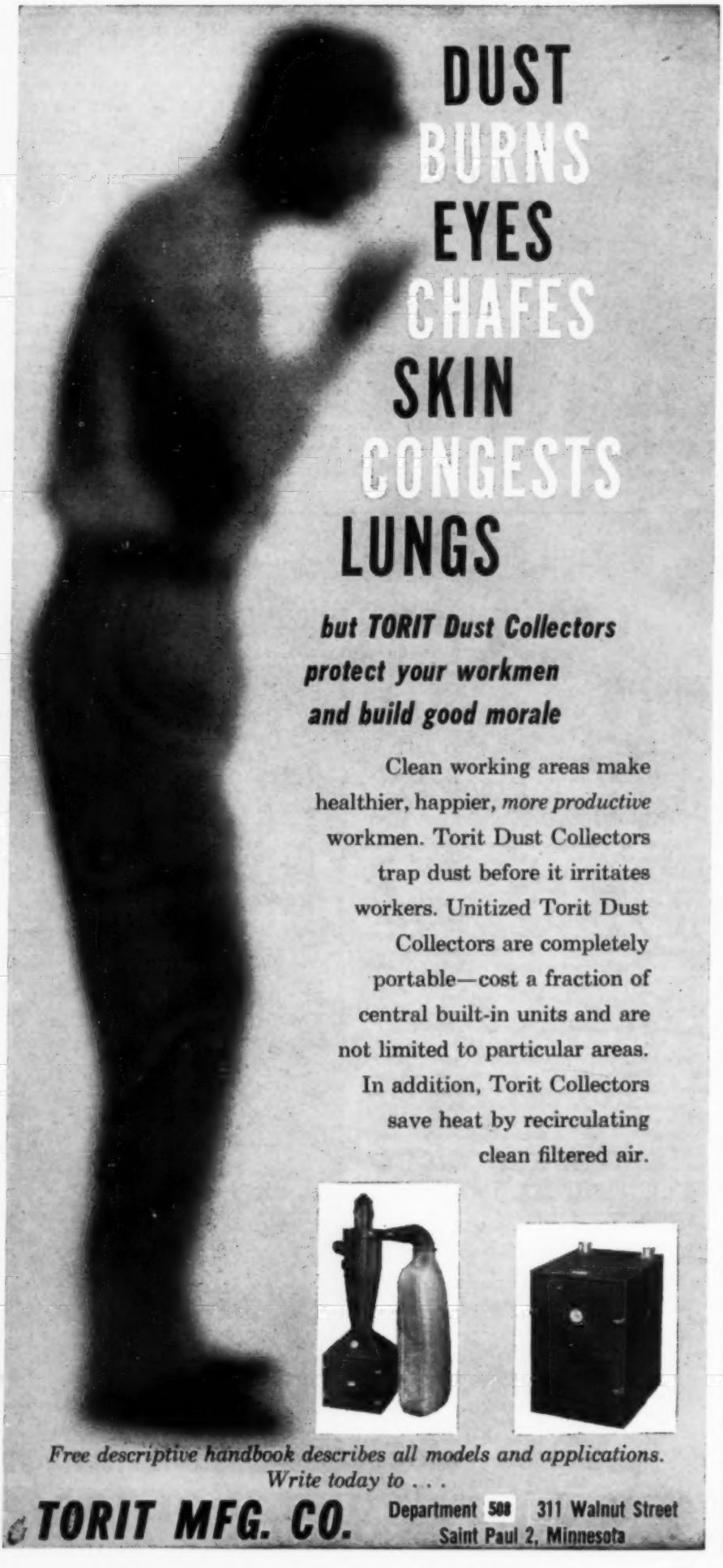


MOORE SPECIAL TOOL COMPANY, INC.
725 Union Avenue, Bridgeport 7, Connecticut

HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES



but TORIT Dust Collectors protect your workmen and build good morale

Clean working areas make healthier, happier, *more productive* workmen. Torit Dust Collectors trap dust before it irritates workers. Unitized Torit Dust Collectors are completely portable—cost a fraction of central built-in units and are not limited to particular areas. In addition, Torit Collectors save heat by recirculating clean filtered air.

Free descriptive handbook describes all models and applications. Write today to . . .

TORIT MFG. CO. Department 508 311 Walnut Street Saint Paul 2, Minnesota

Saw Chain Grinder Remachines Speedily, Safely

Designated the Model 30 Peerless, this grinder for quickly sharpening chain saw cutters is compact, accurate, and easy to operate. It is semi-automatic with a foot-feed on the grinding wheel, and can be used on its own pedestal or on a bench.

Engineered for the precision remachining of chipper, chisel and cross-cut saw chains, the grinder is fully adjustable both horizontally and vertically. The grinding wheel pivots on the exact centerline of the saw chain thereby grinding both left and right-hand cutters identically. A high speed reversible motor provides the right amount of power, grinding both left and right-hand cutters in the right direction to reduce heat and wire edges.

An electrically-operated clamp holds each cutter firmly near the top while the grinding wheel is grinding. A foot treadle lowers the grinding wheel to pre-set position, providing the same bevel, height, length and depth on every cutter, the manufacturer reports.

Included with the machine are an extension bar for long chains, a diamond dresser, and four sizes of grinding wheels. Total weight is less than 70 lb.

The Fate-Root-Heath Co., Grinder Div., Plymouth, Ohio.

Use postpaid card. Circle No. 129

"Honest, Officer! I was only going the legal speed—9,504,000 S. F. P. M.!"

... wherever abrasive operations are performed

Abrasive Society News

Connecticut Chapter — Columbus Hall, Wallingford, Conn. was the meeting place, Nov. 24. The members enjoyed a program presented by James F. Hartman of International Research and Development Corp. on the subject of Detecting and Locating Industrial Vibrations in Grinding Wheel Balancing.

Boston Chapter—The November 25 meeting was held at the Massachusetts Institute of Technology in Cambridge with 40 in attendance. Donald N. Duffney of Roto-Finish Co., Kalamazoo, Mich., spoke on Tumbling and Barrel Finishing. The Chapter will next meet on January 27, 1959.

Western Massachusetts Chapter—Oaks Inn in Springfield was the gathering place for the November 17 meeting, with fifty in attendance despite the cold, rain, and sleet. Speaker of the evening was Asher Nesin of the Micro-Abrasive Corp., Westfield, Mass., whose topic was Abrasive Grains. This covered the methods of manufacture, properties, and uses of the various basic abrasive materials. On December 15 the Chapter was scheduled to meet again at the Oaks Inn for a program on Coated Abrasives, to be presented by Behr-Manning Corp.

Detroit Chapter—The October 30 meeting was held at the Junior Auditorium, E.S.D. Rackham Bldg. Warren K. Seward, Supervising Engineer of New Markets and Application Development of the Coated Abrasives Division of the Carborundum Co., spoke on the common sense approach to coated abrasives and dealt with stock removal, tolerance and finish, new developments, and the future outlook for coated abrasives.

The following were nominated for office for 1959: Pres., Emil Vogely; 1st Vice-Pres., Fred Schlie; 2d Vice-Pres., Edward R. Sorensen; 3d Vice-Pres., John Gills; and Treasurers, Dennis Hurley and Jack Hucklins.

The November 20 meeting featured a program on Methods and Applications of Filtration, presented by Herbert W. Wills, Vice-President of Hydromation Engineering Co.

The December 4 meeting was scheduled to be held at Guffins House of Beef near Framington. Following dinner, a program of fun in charge of Jack Kennedy of General Electric was planned for.

Reservations for meetings are to be made with Dennis Hurley, phone JO 4-6984 or KE 3-8374.

HUDSON-MOHAWK CHAPTER—Newly elected officers are left to right: Pres., George K. Shako of Shako, Inc., and George H. Lovegrove, Marshall-Eclipse Div., Bendix Aviation Corp., new Vice-President.

Reading Chapter—Valley Inn, Pennside, was the scene of the November 17 meeting, with Chapter President, Howard Burkhart, in the chair. Attendance totalled 27. J. Meehan, Assistant to the General Sales Manager, Machine Tool Div., Brown & Sharpe Manufacturing Co., was speaker for the evening. He showed interesting slides on Grinding to Millionths. The December 15 meeting was scheduled to be held at Valley Inn also.

New Jersey Chapter—81 attended the November 19 meeting at the Blue Shutter Inn, Union, N.J. Talks and slides on the subject of Man-Made Diamonds were presented by **James T. Elovich,** General Electric, and J. A. Mueller and J. W. Ripple of Carborundum. The next meeting of the Chapter, at Blue Shutter Inn, was planned for January 28, with the topic to be Electrolytic Grinding.

Secretary of the Chapter is J. A. Cornell, 194 Arlington Dr., Fords, N.J.

Hudson-Mohawk Chapter—November 3 meeting was at the Kingsborough Hotel, Gloversville, N.Y., with a good attendance of members and guests.

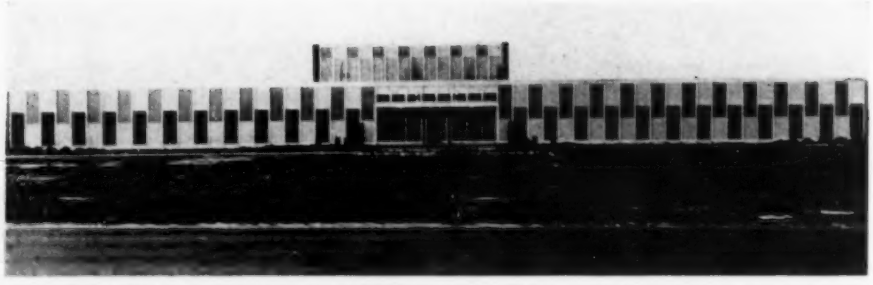
At a business session the following officers were elected: Pres., G. K. Shako; Vice-Pres., George H. Lovegrove; Treas., Otto Gunther; Secy., L. Smith, Jr.; Governor for five years, E. J. Niccolai, and Governor to fill unexpired term of John Durnam who resigned, C. E. Bennett.

There followed a visit to the plant of the Curtin-Hebert Co. at Gloversville to inspect grinding operations. The next meeting was planned for January 5 at Schenectady, N.Y.

Long Island Chapter—53 attended the November 12 meeting at Wheatly Hills Tavern at Westbury. John Mueller of Carborundum Co. showed slides and gave an interesting talk on the proper use of Grinding Wheels. The December 14 meeting was scheduled to be held at Wheatly Hills Tavern also.

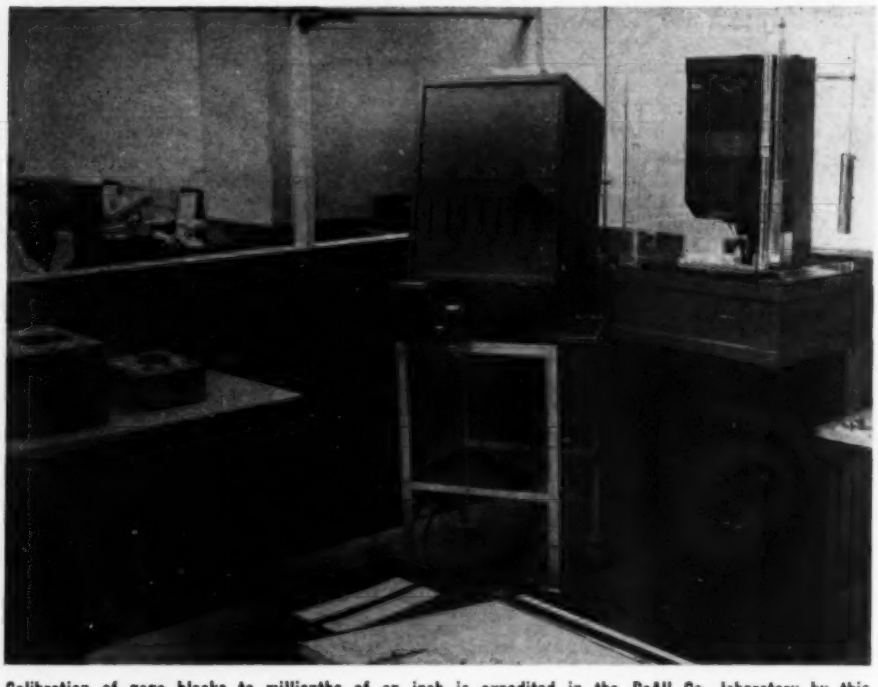
wherever abrasive operations are performed

News of Industry



Hitchcock Publishing Co., publishers of GRINDING and FINISHING, and other magazines for the metalworking, woodworking and transportation industries, dedicated a $350,000 building on the outskirts of Wheaton, Ill., November 29. The new 30,500 sq. ft. quarters are centered on a five-acre tract with lawn in front and a 200-car black-topped parking lot at the back of the building, as well as a two-acre lake. Editorial and production offices are located in the west wing, sales and circulation in the eastern half, and typesetting and other facilities behind them. The exterior is designed in modern glass, red brick and blue curtain wall (porcelain enameled, fibre glass insulated steel). Interior walls are tiled with imported Italian mosaic. Constructed for greatest possible efficiency in multiple-magazine publishing.

DoAll Tightens Tolerances in New Metrology Laboratory



Calibration of gage blocks to millionths of an inch is expedited in the DoAll Co. laboratory by this Link Fringecount Micrometer.

Gage blocks are mass produced in the remodeled and expanded metrology department of The DoAll Co., Des Plaines, Ill., to standards that even a decade ago would have been considered laboratory curiosities. The controlled environment area for finishing and calibration has been enlarged one-third and equipped with an electronic precipitator air conditioning system that removes dust particles as small as 1/25,000,000th inch. A Link Fringecount Micrometer has been added to the line-up of precision metrology equipment so that dimensions in millionths are discussed as easily as thousandths are in the shop.

Gage block manufacture starts in the plant along with other precision work. They are machined, carefully heat treated and stabilized. The special stabilizing process requires a lower temperature than it is possible to obtain with standard equipment. Therefore, the company has built its own three-stage unit which provides a minimum temperature of —180° below zero and sufficiently rapid heat transfer to completely stabilize the blocks. After stabilizing, the blocks are then accurately ground to within a few thousandths of the finished size. At this point they enter the controlled environment area for finishing. There, extreme precautions are exercised to control all the variables affecting size and finish of the blocks.

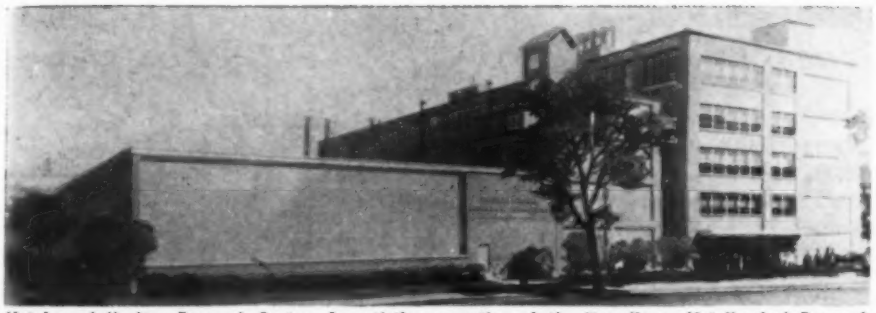
Air-borne dirt and foreign matter must be eliminated to obtain optical quality surfaces in quantity production.

Temperature must be meticulously controlled to assure uniform accuracy in millionths. All standard measurements are expressed at 68° F, and therefore, the temperature is maintained as closely to that temperature as modern air conditioning science will permit.

Because calibration of gage blocks is accurate to within millionths of an inch, additional measures are taken to remove or compensate for all known variables. Both the new Link Fringecount Micrometer and the Zeiss Optom Interferometer, as well as other instruments used in calibration of master gage blocks, depend upon light waves for their accuracy. Light waves are affected by barometric pressure and for that reason, this too is under careful surveillance. The company has two master barometers—one in use while the other is being calibrated.

Even though the entire area is designed to be as free from vibration as possible, the sensitive instruments are mounted on special vibration-proof foundations. Though extraordinary temperature stability is provided, the instruments are enclosed in shielded cases to further prevent minute changes due to drafts or radiant heat.

The new capacity of the metrology laboratory will enable the company to continue its policy of maintaining a full line of the highest quality gage blocks for immediate delivery in each of their 38 local sales-service stores.



Metals and Nuclear Research Center: An artist's conception of the New Haven Metallurgical Research Laboratories being built by Olin Mathieson Chemical Corp. of New York City at a cost of approximately $4,000,000, scheduled for completion by mid-1959. The facility will include metals research laboratories and nuclear fuel research laboratories. The 40,000 sq.-ft. pilot production plant is at left. Adjacent to the pilot plant is a five-story building (right) housing the laboratories, model shops and offices.

Building Named for Carborundum's Acheson

Rapidly-growing University of Buffalo has named its new chemistry building now under construction the Edward Goodrich Acheson Hall of Chemistry as a memorial to one of America's most distinguished inventor-scientists whose major industrial activities for many years centered at Niagara Falls.

Acheson's discoveries and researches in electrochemistry and electrometallurgy ranged over a wide field. Acheson's invention in 1891 of the diamond-like abrasive for which he coined the trade name Carborundum made modern mass industrial production possible. Without Carborundum silicon carbide and the other man-made abrasives that followed it, the manufacture of precision ground, interchangeable parts essential to economical large-scale production would have been impossible.

When on July 6, 1931 Acheson died, Thomas Edison said of him, "As a former associate I know the world loses a great genius," and the press generally acclaimed him "one of the inventive geniuses of his time."

The Carborundum Co., which Acheson formed in 1891 to manufacture and market silicon carbide, has grown to be one of the giant industries of the country, with an ever-broadening group of products, with annual sales of more than $100,000,000, with more than 7,000 employees in the United States and Canada, and with 33 plants in 11 countries.

DIAMONDS
matched to industry!

Clipper fits the diamond tool to your exact requirements. Outstanding application experience is translated into the ideal diamond tool. Engineering and production facilities, second to none, are available to you. So, get our recommendations on

Single-pointed diamond wheel dressers
Cluster-type diamond wheel dressers
Diamond-impregnated wheel dressers
Thread grinding tools
Special-shaped diamond tools for turning and boring
Diamond tools for radius dressing and radius forming
Also outstanding selection of diamond wheels and hones.

Latest Literature . . .

The new Clipper Diamond Catalog CW58 will be sent on request.

Clipper Diamond Tool Co.

345 HUDSON STREET, NEW YORK 14, N. Y. • CHelsea 2-7143

SEND FOR CATALOG

NAME

TITLE

COMPANY

STREET

CITY/STATE

RAISE GRINDING PRODUCTION

FOR $2.70

A typical Desmond Huntington grinding wheel dresser costs about $2.70 from your distributor, yet it substantially increases grinding production, makes wheels cut better, and lowers grinding costs. By dressing all your grinding wheels regularly you remove inefficient dull particles and loaded metal, expose a fresh new grinding surface. Your Desmond distributor can furnish the exact model you require. Ask his advice.

The only complete line of grinding wheel dressers and cutters

Desmond

The Desmond-Stephan Mfg. Co.
Urbana, Ohio

FEEDCISION

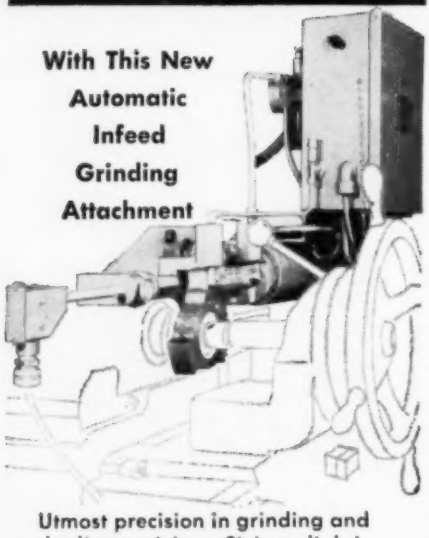
INCREASES CENTERLESS GRINDING PRODUCTION

200%

YES

300%

With This New Automatic Infeed Grinding Attachment



Utmost precision in grinding and duplicate sizing. Sizing dial is graduated in (.00001) one hundredth of a thousandth of an inch. No hydraulic checking cylinder to change feed rate when oil is cold. No checking of oil level or refilling of hydraulic checking cylinder. Three (3) different feed rates are available in one unit for the fastest, most efficient, and precise sizing in a centerless grinder.

CAN BE USED FOR TRU-FEED AS WELL AS INFEED for close sizing. Ideally located push button control station consists of Stop-Button, Caution Pilot Light, and a selector switch for set up or auto grinding positions. **CATALOG** — Write for it today!

MODERN DEVICES

Subsidiary of

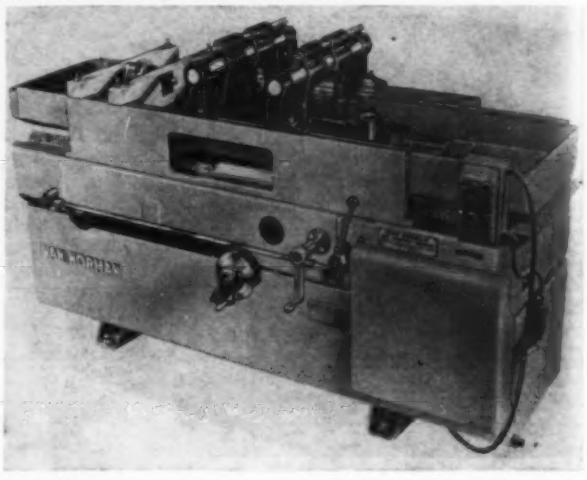
TWENTIETH CENTURY MFG. CO.

Box 429G Libertyville, Illinois

Open Territories for Manufacturers' Representatives

International Automotive Service Industries Show Navy Pier, Chicago, February 18-21, 1959

Van Norman Automotive Equipment Co., Springfield, Mass., will demonstrate several machines, brake drum lathes, automotive surface grinder, crankshaft regrinder and camshaft regrinder.



The surface grinder (shown) will feature the Cycl-O-Matic feed control which permits completely automatic material removal without the presence of the operator. The Van Norman crankshaft regrinder to be displayed has been designed as a wide range heavy-duty grinder. The camshaft regrinder is being shown as an addition to machine shop equipment, in view of the current rise in camshaft regrinding business. According to Van Norman, a camshaft can be reground for about half the cost of a new shaft.

Sunnen Products Co., St. Louis, Mo., will have an actual demonstration of connecting rod reconditioning, pin fitting in pistons and rods, and grinding crankshafts. Featured in the display will be the company's new rod reconditioning method .

DoAll Distributes Diatronic Diamond Wheels

Diatronic diamond cutting wheels will be distributed by the DoAll Co. of Des Plaines, Ill., it was announced by H. O. Bales, General Manager of Navan Products, Inc., Los Angeles.

Diatronic diamond wheels are manufactured by a new method which permits quantity production of thinner wheels to closer tolerances than formerly possible. The new wheels are now used by leading diode and transistor manufacturers to slice and dice germanium and silicon crystal.

The availability of precise diamond wheels has aroused the interest of airplane and missile manufacturers who need new tools to cut the new high temperature steels and alloys they are now using.

Armour & Co. Offer Technical Advisory Service

The first nation-wide automotive coated abrasives technical advisory service has been announced by the Armour Coated Abrasives Division, Armour and Co., Alliance, Ohio.

This new service, available without charge, will be designated as the Automotive Section of Armour Technical Service. It will be staffed by abrasive engineers who have had practical experience in automobile production and who have specialized in automotive coated abrasive application problems.

Readers desiring further information about this new coated abrasive service for the automotive industry may write to the Armour Coated Abrasives Division, Armour and Co., Alliance, Ohio (or contact the local Armour representative).

ASTE Visits Sunnen Products Co.

Steady rain and overcast skies failed to dampen the interest of 202 tool engineers who arrived at Sunnen Products Co.'s main plant in St. Louis on the evening of December 4 to inspect the premises and its production facilities.

In a welcoming area, a complete display of Sunnen's precision honing and gaging equipment was examined. An arrow-marked path from this area guided visitors past an imposing array of modern precision manufacturing facilities, such as, honing and gaging, electrical discharge machining, precision jig boring and thread grinding, all in operation.

Sturtevant Mill Advances in Grinding Abrasive Materials

Officials of Sturtevant Mill Co. of Dorchester, Mass., engineers and fabricators of the Micronizer fluid energy mill, announced recently that a number of abrasive materials which previously could not have been reduced to micron sizes without damage to the unit and contamination of the feed now may be ground successfully. This was said to be possible by using tungsten carbide, aluminum oxide and other extremely hard liners for the Micronizer in tests on severely abrasive materials.

Now materials under the hardness of tungsten carbide may be reduced practically to several microns in size without harmful effects, it was reported. Tungsten carbide itself has been ground successfully to three microns in the units.

Experimental fine grinding activities for industry are carried on at the Dorchester laboratories at cost of set-up and labor. Custom grinding also is offered.

Johnson-Devou Moves and Takes New Name

Johnson-Devou, with offices in Auburn and West Springfield, Mass., has taken a new name—Abrasives & Tools, Inc. On December 1, the Springfield office of the firm moved into their new building in West Springfield at 131 Wayside Ave., from their location in Springfield at 749 Liberty St.

New Society of Aircraft Materials-Process Eng'rs

A new technical society, to meet some of the requirements of the space age, is now being formed on the East Coast to complement a similar group now existing on the West Coast and in the Southwest. The new unit is called the Society of Aircraft Materials and Process Engineers (SAMPE), Eastern Division. The Society will be concerned with problems of aircraft and missile materials and processes.

Persons interested in the new chapter are invited to write to John S. Thorpe, Application Development Engineer—Aircraft and Missiles, Allegheny Ludlum Steel Corp., Bell Bldg., Tarentum, Pa.

Changes at U.S. Rubber Co.

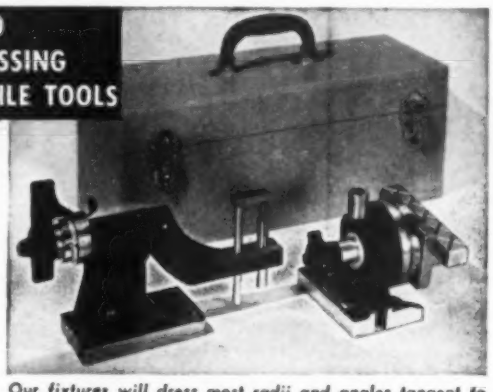
United States Rubber Co. announced an expansion in the manufacturing and sales facilities at its Eagle Street plant as of December 15, 1958. The rubber company's 94-year-old grinding wheels division, currently located in Ft. Wayne, Ind., is being moved to Providence.

The new facilities at 10 Eagle Street will handle manufacture of resin and rubber bonded grinding wheels for steel mill snagging, foundries, centerless grinding, roll grinding, fabricators and many other specialized applications. The rubber company's nationwide sales effort in this field also will be directed from Providence.

Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

MIGHTY GOOD AT ANY PRICE BUT TOPS AT ONLY $149.50
(Both tools including diamonds)

The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. The G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc., on any desired angle.



Our fixtures will dress most radii and angles tangent to each other, similar to those shown below.

FREE handsome, wooden storage box. Write for complete information.

PURCHASE EITHER TOOL SEPARATELY

Now you can purchase either the G-5 Radius Dresser or the G-2 Angle Dresser and Tool Holder separately if you so desire. (Without storage boxes)

G-5 Radius Dresser complete with diamond $80.00.

G-2 Angle Dresser and Tool Holder complete with diamond $87.50.

Replacement diamonds are always available for our units at a reduced price. Diamonds for the G-2 $5.00 each; diamonds for the G-5 $8.00 each.

Distributorship available in select territories

ROTHFUSS TOOL COMPANY

BOX 2696, ELMWOOD STATION PROVIDENCE 7, R. I.

● ACTUAL MANUFACTURERS OF RESINOID METAL AND VITRIFIED DIAMOND WHEELS UP TO AND INCLUDING 20" DIAMETERS

Call or write for literature today!

TRADE MARK THE P. L. KUZMICK CO. VERONA, N.J.

THE PAUL L. KUZMICK COMPANY
271-279 GROVE AVE.
VERONA, N.J.

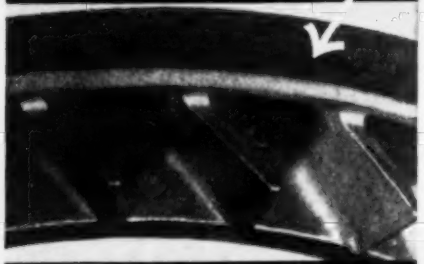
● MANUFACTURERS OF RESINOID AND RUBBER BONDED WHEELS SERVING THE AIRCRAFT, CUTLERY AND STEEL FABRICATING INDUSTRIES.

Call or write for literature today

PEKAY ABRASIVES, INC.
271 GROVE AVE.
VERONA, N.J.

MICROBEADS GLAS-SHOT® FOR BLASTING

CAN IMPART THIS MICROFINISH



TO THIS SURFACE IN SECONDS

Microbeads Glas-shot are microscopic glass beads for use with all types of wet or dry blast equipment. You can use Microbeads Glas-shot for cleaning, polishing, peening or finishing of all materials normally processed with blast equipment. If you've never used Microbeads Glas-shot you're in for the surprise of your life.

FOR COMPLETE INFORMATION AND SAMPLES . . . JUST MAIL THE COUPON BELOW

Microscopic Glass Beads for Industrial and Reflective Purposes

MICROBEADS INC.
P.O. BOX 241
JACKSON, MISSISSIPPI

☐ **Send information and samples**

☐ **Have representative call**

Name

Title

Firm

Street

City Zone State

BL-159

NMTBA Officers Named

Ralph J. Kraut, President of Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., was elected President of the National Machine Tool Builders' Association at its 57th Annual Meeting held at Hot Springs, Va., Nov. 4-7.

R. J. Kraut

A. C. Mattison

Alan C. Mattison, President, Mattison Machine Works, Rockford, Ill., was elected First Vice-President, and

E. M. Hicks

G. E. Marx

Everett M. Hicks, Vice-President and General Manager, Grinding Machine Division of the Norton Co., Worcester, Mass., was elected Second Vice-President. **Graham E. Marx,** Vice-President

W. K. Bailey

J. K. Fulks

and General Manager, The G. A. Gray Co., Cincinnati, Ohio, was re-elected Treasurer. **Walter K. Bailey,** President of the Warner & Swasey Co., Cleveland, Ohio, was re-elected Secretary.

New Directors elected were **Hicks, James K. Fulks,** Executive Vice-Presi-

G. M. Stickell

Ludlow King

dent, Ex-Cell-O Corp., Detroit, Mich., and **Grayson M. Stickell,** President and General Manager, Landis Machine Co., Waynesboro, Pa.

Ludlow King, was re-elected Executive Vice-President of the Association.

Conforms to ASA Safety Code requirements for cupwheel guards

CARROLL'S SAFETY-GUARD INSERTS

Give you BUILT-IN Operator Safety and Top Performance.

This radically new Safety Guard Insert with its integrated revolving guard gives you the all-important safety factor with increased wheel strength and efficiency.

Added economies in production are gained from the ready-made molding form provided by the Guard. True dynamic balance, back flatness and concentricity, show consistently close tolerances within .010 T.I.R.

Safe grinding wheels mean increased production — use and specify wheels with the new Carroll Safety Guard.

• A Positive Guard on Every Cup Wheel • Highest Safety Factor • One Piece Assembly • Increased Strength • Light Weight • Fool Proof Mounting • No Adjustment Necessary • True Dynamic Balance

PM INC. *Write for Information on Carroll's Safety Guard Insert*

CARROLL
PRESSED METAL, INC.
133 DEWEY ST.
WORCESTER 10, MASS.

H. Ernst

F. Colonnese

E. L. Auker

D. R. Spotz

R. Anderson

W. Yates

Ernst of Cincinnati Milling Appointed Univ. Professor

The University of Cincinnati has appointed **Hans Ernst**, internationally-known research engineer, to the Herman Schneider research professorship in the College of Engineering.

For 32 years Director of Research at the Cincinnati Milling Machine Co., Professor Ernst retired in 1957 and is now the company's research consultant. He has contributed widely to engineering and scientific journals and has appeared as speaker before many technical societies, with special reference to the machinability of metals.

The new chair to which Professor Ernst has been named honors the late Dr. Herman Schneider, long dean of the University's College of Engineering and founder in 1906 of the now widely-used Cincinnati plan of co-operative engineering education.

Frank Colonnese has been appointed Superintendent of the Bridgeport (Conn.) Thermostat Division of the Robertshaw-Fulton Controls Co. of Richmond, Va. He will be in charge of production. Colonnese formerly was Assistant Superintendent for the Milford, Conn., manufacturing concern.

Grinding Wheel Institute Elects Auker Chairman

Elden L. Auker, 130 Gulf Rd., Shrewsbury, Vice-President of Marketing, Bay State Abrasive Products Co., Westboro, Mass., was elected Chairman of the Board of Directors of the Grinding Wheel Institute at their annual meeting in New York City. The Institute is composed of 32 grinding wheel manufacturing concerns throughout the country.

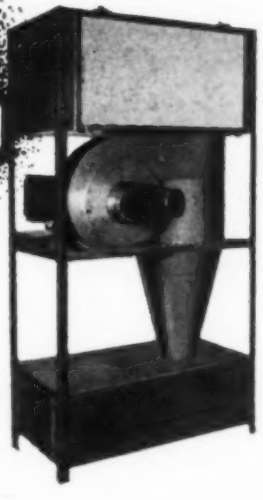
Donald R. Spotz has been promoted from Vice-President and General Sales Manager to President and General Manager of Pesco Products Division and Wooster Division, Borg-Warner Corp., Bedford, Ohio. Spotz succeeds **R. A. Powley** who recently resigned. He will direct and coordinate activities of all branches of the divisions in Wooster, Ohio, Burbank, Calif., and Hialeah, Fla.

Ralph C. Anderson has been assigned to the greater Milwaukee area, with headquarters in the Chicago office, as field cutting tool engineer for the Cutting Tool Division of Brown & Sharpe Manufacturing Co. of Providence, R.I. **William H. Yates** has been assigned the lower Connecticut area which also includes Long Island.

These cutting tool specialists are qualified to advise on cutting tool selection, cutter use, cutter design, machine fixture design, machine tool power requirements and other metalworking functions.

EFFICIENT—LOW COST

Dust Collection



Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dustkop *FIRST* among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units; or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.

DUSTKOP STOPS DUST

37 STANDARD MODELS TO CHOOSE FROM

• READY TO USE

Also a Complete Line of Mist Collectors

AGET MANUFACTURING COMPANY

1380 E. CHURCH ST. • ADRIAN, MICHIGAN

LOW COST

SAND BLASTER

Squeeze the Trigger and *Remove*

RUST
OLD PAINT
CARBON
WELD SCALE
to the bare metal!

COMPLETE, READY FOR YOUR COMPRESSOR

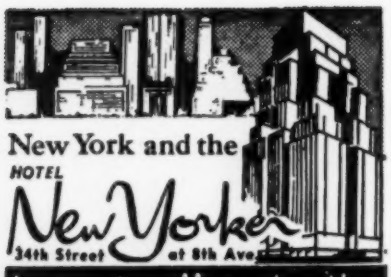
$29.95

The Sandy Jet "Spot" Blaster quickly and easily cleans rust, paint, carbon, dirt, and weld scale right down to the bare metal from body mouldings, seams, corners, "blind-spots", and engine parts. Finger-tip control lets you "spot clean" right where the rust is. Requires no special room—just a cardboard—to keep abrasive confined. Operates on average garbage compressor at 100 to 185 lbs. pressure. Abrasive capacity is 12 quarts of low cost silica sand, metal shot, nut shells, or aluminum oxides. Uses liquid detergents for engine and parts cleaning. Shipped complete with extra blast nozzle, **$29.95.**

Satisfaction Guaranteed or Ship Blaster Back in 10 Days for Full Refund!

A. L. C. Company

646 OAK ST. Dept. G-1 MEDINA, OHIO



New York and the HOTEL New Yorker
34th Street at 8th Ave.
just naturally go together

New York's largest skyscraper hotel. 2500 rooms, all with bath and free radio—television in many. Meditation Chapel open to all faiths. Direct entrance to Pennsylvania Station. Facilities from 100 to 1200 for Banquets, meetings, etc. Three air-conditioned restaurants.

LAMP POST CORNER . . . COFFEE HOUSE
GOLDEN THREAD CAFE

from $7 Doubles from $11 Suites from $23

JOSEPH MASSAGLIA JR., President
CHARLES W. COLE, Gen. Mgr.

Other MASSAGLIA HOTELS
- SANTA MONICA, CALIF. Hotel Miramar
- SAN JOSE, CALIF. Hotel Sainte Claire
- LONG BEACH, CALIF. Hotel Wilton
- GALLUP, N.M. Hotel El Rancho
- ALBUQUERQUE, Hotel Franciscan
- DENVER, COLO. Hotel Park Lane
- WASHINGTON, D.C. Hotel Raleigh
- HARTFORD, CONN. Hotel Bond
- PITTSBURGH, PA. Hotel Sherwyn
- CINCINNATI, O. Hotel Sinton
- NEW YORK CITY Hotel New Yorker
- HONOLULU Hotel Waikiki Biltmore

CHICAGO MIDWEST HEADQUARTERS
BOOKING OFFICE 200 E. Walton DE 7-6344
BOSTON OFFICE 80 BOYLSTON ST. HU 2-0060

World-famed hotels
Teletype service—Family Plan

Tom Carroll, formerly Sales Manager, has just been appointed Vice-President in Charge of Sales for The Dumore Co., Racine, Wis., manufacturer of a long line of portable precision milling, drilling and grinding tools and accessories for the metalworking industry.

Harry Wardrip, recently Assistant Sales Manager, has been promoted to Sales Manager,

REPRESENTATIVES

To sell unusually complete line of proven Barrel Finishing Equipment, Compounds and Abrasives manufactured by specialists with years of practical experience. Field expanding rapidly. Repeat business builds steady income. Some excellent territories available. Send details on experience, lines handled, territory covered and references.

ESBEC BARREL FINISHING CORP.
18 Beech St. Byram, Conn.

DEMONSTRABLY, the WORLD'S FINEST
DIAMOND WHEEL LINE
AVAILABLE IN
RESTRICTED TERRITORIES
We are seeking expanded distribution control in all key U.S. Industrial areas.
Box 22
Grinding & Finishing, Wheaton, Ill.

REPRESENTATIVES AND SALESMEN
WANTED FOR SEVERAL TERRITORIES
EAST OF MISSISSIPPI
complete diamond tools, wheels, etc., line, services.
Box No. 26, GRINDING & FINISHING
Wheaton, Illinois

T. Carroll

H. Wardrip

Solar Aircraft Co.'s Des Moines, Iowa, operations have been established as a fully integrated division of the company, **W. G. Dollmeyer,** Vice-President-Operations, announced. **Bruce A. Willsey**, formerly Manager of Solar's Des Moines plant, will become Vice-President and General Manager of the division.

Separate sales and development engineering groups will be added to the Des Moines operations, and they will report to Willsey.

Joseph G. Sidak, a veteran of 18 years with Solar, has been promoted to Assistant Treasurer of the company and Comptroller of the new division.

ACCURACY .0002 T.I.R.

.0002 T.I.R. or less at Spindle Nose, .0005 T.I.R. or less on Test Arbor six inches from Spindle Nose

SPINDLE SPEEDS 150 and 250 RPM Other Spindle Speed Pulleys Available

MODEL B943 MOTOR DRIVEN WORK HEAD

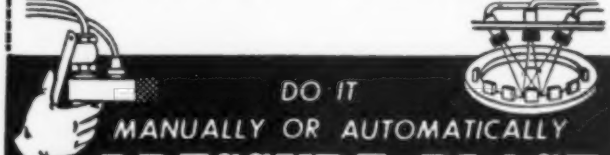
No. 11 B & S Tapered Spindle Standard Equipment. No. 12 B & S or No. 5 Morse Available at Slight Extra Cost.

Clip ad to your letterhead and send for Literature

K. O. Lee Company, Aberdeen, S. D.

which of these POLISHING PROBLEMS are yours?

- ☐ Reduction of belt sanding stages
- ☐ Cutting down buffing time
- ☐ Reduction of hand polishing
- ☐ Blending directional grind lines
- ☐ Lowering micro-inch finishes
- ☐ Exposing cracks and fractures
- ☐ Smoothing belt marks
- ☐ Imparting non-directional finishes
- ☐ Semi-reflective surfacing
- ☐ Blending brush marks
- ☐ Surface uniformity
- ☐ Removal of stress marks
- ☐ Obliterating
  - ☐ Scores ☐ Tool marks
  - ☐ Reliefs ☐ Chatter
  - ☐ Pits ☐ Scratches
- ☐ Matte finishing
- ☐ Thread fit and turnability



DO IT MANUALLY OR AUTOMATICALLY WITH PRESSURE BLAST WET BLASTING

TWO SPEED

This ad is your coupon. Check off your problem (s) and mail today for free illustrated literature . . . Application data . . . case history information!

PRESSURE BLAST MFG. CO. Inc.
24 PLEASANT ST., MANCHESTER, CONN.

Obituary

G. E. Gernon

George E. Gernon, Secretary of the Gisholt Machine Co., Madison, Wis., passed away October 16, 1958. Death came to Gernon in a Madison hospital, terminating 58 years of continuous service to Gisholt.

Victor F. Stine, 65, President of the Pangborn Corp., Hagerstown, Md., died October 29. Stine started his business career with Pangborn in 1912. Throughout the years he has served his company in sales and many administrative capacities. He was elevated to the presidency two years ago.

James K. Watkins, 64, chief engineer at Crucible Steel Co.'s Midland Works, died of a heart attack, November 13, at his place of work. A veteran of 42 years in the steel industry, Watkins joined Crucible in 1954. Previously he was chief engineer for Pittsburgh Steel Monessen Works.

A. J. Miller, Sr., Chairman of the Board, Chicago Wheel & Mfg. Co., passed away Dec. 9. Word was received from the Grinding Wheel Institute, Abrasive Grain Assn., Cleveland.

J. D. Williams

H. F. Hodgkins, Sr.

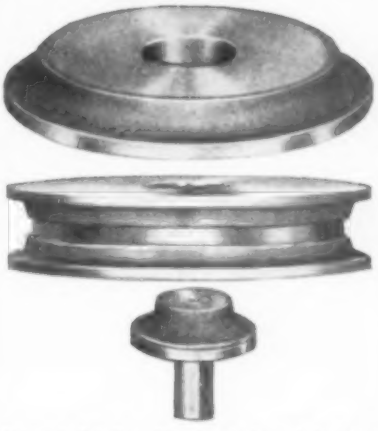
Williams Elected Pres. Of Lipe-Rollway Corp.

John D. Williams has been elected President of Lipe-Rollway Corp. and Rollway Bearing Co., Inc., Syracuse, N.Y., manufacturers of heavy duty clutches, industrial machine tools and precision bearings. Williams succeeds **H. Follett Hodgkins, Sr.,** who becomes Chairman of the Board.

Other management changes include the appointment of **Robert M. Zimmerman** to the post of Vice-President, Lipe-Rollway Corp. **H. Follett Hodgkins, Jr.,** has been named Vice-President of Rollway Bearing Co., Inc., a wholly-owned subsidiary.

Williams, a member of the Anti Friction Bearing Manufacturers Assn., has served the company in various capacities during the past 28 years. Hodgkins, Sr., who has been with Lipe-Rollway for 32 years, was formerly President of both Lipe-Roilway Corp. and Rollway Bearing Co., Inc., Syracuse.

NO NEED FOR COSTLY DIAMOND WHEEL DRESSING



Diamond Grinding Wheels Contoured to Your Specs. . . . With our Electro Formed Nickel Matrix. The Ultimate in Shape Retention at a Fraction of Your Current Wheel Costs.

Diamond Quills Available from .014" diameter Cut-off Wheels down to .004" in thickness.

Sample Marshall Laboratories, Inc.
Manufacturers Of Quality Diamond Tools
63 Park Avenue Lyndhurst, N.J.
WEbster 3-0570

KAY & WARREN COMPANY
Reclaimers of
Industrial Diamonds and Diamond Powders
33 Box Street **Brooklyn 22, N.Y.**

Our reclaiming department salvages diamond powders from wheels, sludges, hones, saw blades, cotton wastes or any type of diamond bearing material. We will submit quotations on an analysis basis.

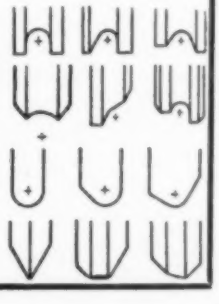
Inquiries Invited!

WHY WASTE TIME?

Dress Profiles like these in a few minutes without Templates or Crusher Rolls with the Jeon Automatic Angle Tangent to Radius Dresser. It's fully universal.

Patented

CONCAVE DRESSING TOOL

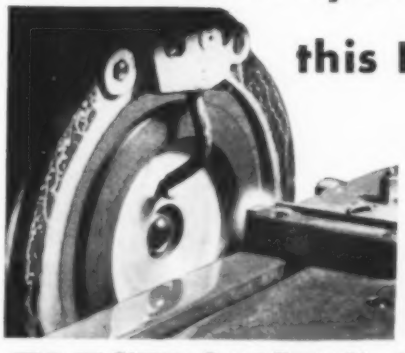


Write for Price and Folder

Representatives Wanted In Some Areas

JEON MANUFACTURING CO.
P. O. BOX 6750 WASHINGTON 20, D. C.

NOW...Better by actual test...



this NEW A.I.T. "E-2" Diamond Wheel for...

ELECTROLYTIC GRINDING

The exclusive "E-2" bond in A.I.T. diamond wheels has been developed specifically to guarantee that you get the FULL VALUE out of Electrolytic grinding of carbides. We can prove this in YOUR plant, on YOUR grinders, with these results:

1. **Wheel pre-run to eliminate break-in time in YOUR plant.**
2. **Faster stock removal.**
3. **High peak removal for longer intervals**
4. **Longer wheel life.**
5. **Less corrosive action**
6. **Specially designed wheel to reduce weight and distribute electrolyte efficiently**

Remember, to get these FULL VALUE results, be sure to send for complete test data today.

A.I.T. Diamond Tool Co.
8215 N. KIMBALL AVE.
SKOKIE, ILLINOIS

Another **fine** product made **finer** . . .

with the PARAMOUNT "Finishing Touch"

MacGregor Golf Co. uses Paramount Felt Wheels as contact wheels for abrasive belts in finishing golf clubs. "They last longer than other contact wheels," says MacGregor's Albert F. Armstrong. "They are the only wheels that will hold up for small work and give a fine finish. Hardness is important in our operations and I find we can get a Paramount Felt Wheel in the exact hardness we require. When the wheels are worn we dress them down for use in other operations. Other wheels give only ¾" use, then require a new tire."

For precision finishes so important to your product's appearance, always specify Paramount Felt Wheels. Call your jobber today.

Paramount
Felt Wheels, Bobs, Sheet Felt

Bacon Felt Co.

West Water St., Taunton, Mass.

Cut your costs - increase your performance with VSM - COATED ABRASIVES

"Old World" standards of craftsmanship and economy, backed by almost 100 years of manufacturing experience, made VSM Coated Abrasives a welcome quality tool throughout industry, assuring their acceptance for,

FAST CUTTING ACTION AND LONGER LIFE
SMOOTH SURFACE AND CONTOUR SANDING
EFFICIENT GRINDING - FINE FINISHES
AT TRULY MONEY SAVING PRICES

VSM Coated Abrasives in BELTS, ROLLS, DISCS and SHEETS

Sole U.S. Factory Representatives

BRUNMAR COMMERCIAL CORP.

Abrasive Sales Division

145 Nassau Street - New York 38, N. Y.

Interesting Territories still open for Distributors

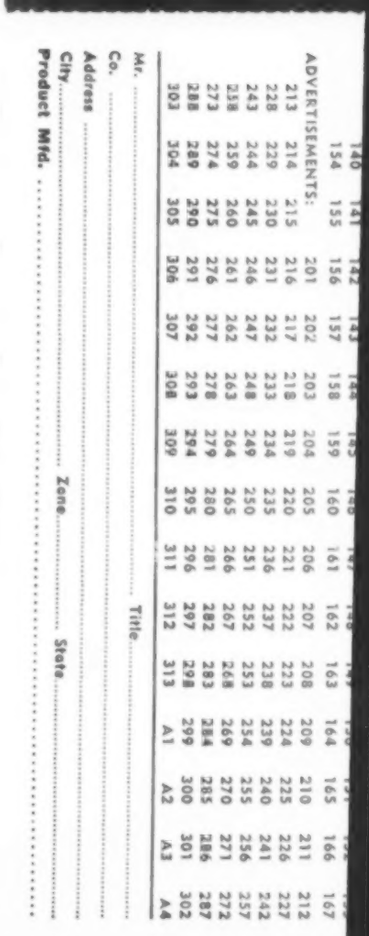
Index to Advertisers in January Issue

TO OBTAIN INFORMATION FROM ANY OF THESE ADVERTISERS, FIND THE BOLDFACE KEY NUMBER *PRECEDING* THE ADVERTISER'S NAME . . . AND CIRCLE THAT NUMBER ON ACTION CARD AT RIGHT

Circle No.		Page No.
201	Action Diamond Tool Company	14
202	Aget Manufacturing Company	69
203	A.I.T. Diamond Tool Company	71
204	A.L.C. Company	69
205	Allison-Campbell Division, American Chain & Cable Company	44
206	Almco, Queen Stove Works, King-Seeley Corporation	47
207	American Chain & Cable Company, Allison-Campbell Division	44
208	Bacon Felt Company	72
209	Bay State Abrasive Products Company	8, 9
210	Behr-Manning Company	11
211	Blanchard Machine Company, Grinding Wheels Division	10
212	Brunmar Commercial Corporation	72
213	Brush Instruments, Clevite Corporation	33
214	Carroll Pressed Metal, Inc.	68
215	Cincinnati Milling Machine Co., Milling Products Division	40
216	Cincinnati Milling Machine Co., Grinding Machine Division	2, 3
217	Clipper Diamond Tool Company	65
218	Commercial Filters Corporation, The Delpark Company	39
219	Crane Packing Company	35
220	Desmond-Stephan Manufacturing Company	65
221	Engelberg, Inc.	53
222	Exolon Company	17
223	Fulmer, C. Allen Company	57
224	Hammond Machinery Builders	58
225	Harig Manufacturing Company	38
226	Heald Machine Company	Second Cover
227	Henry Manufacturing Company	49
228	Hill Acme Company, The	20
229	Hitchcock Publishing Company	Card Insert
230	Hotel New Yorker	70
231	Industrial Distributors	5
232	Jeon Manufacturing Company	71
233	J & S Tool Company, Inc.	56
234	Kay & Warren Company	71
235	Kuzmick, Paul L. Company	67
236	Lee, K. O. Company	70
237	Macklin Company	Third Cover
238	Manhattan Rubber Division, Raybestos Manhattan Corporation	18
239	Mattison Machine Works	19
240	Microbeads, Inc.	68
241	Micromatic Hone Corporation	54, 55
242	Modern Devices (Subsidiary Twentieth Century Company)	66
243	Moore Special Tool Company	61
244	Norton Company	6, 7
245	Pekay Abrasives Company	67
246	Pressure Blast Manufacturing Company	70
247	Queen Stove Works, Almco, King-Seeley Corporation	47
248	Raybestos Manhattan, Inc., Manhattan Rubber Division	18
249	Rivett Lathe & Grinder, Inc.	13
250	Rothfuss Tool Company	67
251	Sample Marshall Laboratories	71
252	Sanford Manufacturing Corporation	60
253	Simonds Abrasive Company	15
254	Smit, J. K. & Sons, Inc.	4
255	Sundstrand-American Broach, Division of Sundstrand Machine Tool Co.	59
256	Thompson Grinder Company	16
257	Torit Manufacturing Company	62
258	United Engineering & Foundry Company	51
259	United States Rubber Company	Fourth Cover
260	Wheelabrator Corporation, Techline Division	12
261	Whitnon Manufacturing Company	50

Handy Information Cards

THE two postpaid post cards at the right are to help you obtain information about products advertised in this issue. These cards provide key numbers for you to circle to get information about any new product item, free literature item or advertisement published in this issue. New product and literature items are numbered where they appear. For information about any advertisement, simply find the manufacturer's name in the Advertising Index above, note the boldface number preceding the name and circle that number on the Action card. Before sending the card, please check to see that you have included your name and address.



TEAR OUT THIS CARD AND MAIL . . . January, 1959

SEND MORE INFORMATION ON ITEMS CIRCLED

LITERATURE:			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
NEW PRODUCTS:					101	102	103	104	105	106	107	108	109	110	111		
	112	113	114	115	116	117	118	119	120	121	122	123	124	125			
	126	127	128	129	130	131	132	133	134	135	136	137	138	139			
	140	141	142	143	144	145	146	147	148	149	150	151	152	153			
	154	155	156	157	158	159	160	161	162	163	164	165	166	167			
ADVERTISEMENTS:			201	202	203	204	205	206	207	208	209	210	211	212			
213	214	215	216	217	218	219	220	221	222	223	224	225	226	227			
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242			
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257			
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272			
273	274	275	276	277	278	279	280	281	282	283	284	285	286	287			
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302			
303	304	305	306	307	308	309	310	311	312	313	A1	A2	A3	A4			

Mr. ..... Title .....

Co. .....

Address .....

City ..... Zone ..... State .....

Product Mfd. .....

FIRST CLASS
Permit No. 13517
New York City, N.Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the U.S.

Postage will be paid by

GRINDING and FINISHING

A Hitchcock Publication

P.O. Box 76, Village Station

NEW YORK CITY, NEW YORK

REPRINTS AVAILABLE

Grinding Outer Surface of Cone Shaped Part

Grinds and Laps in One Operation

Helped Hupp Aviation Solve Visual Finish and Deburring Problems

How and Why of Abrasive Wheels
by James Price & Joseph Biglin

How Heat Distortion Affects Large Surface Grinders
by John C. Wilson

Raw Materials Testing
by James R. Gilman

The Cleaning of Grinding & Finishing Coolants
by Arthur L. Wilson ..... .25

Developing Standard Time Data for Grinding Operations
by E. A. Cyrol $1.00

Grinding and Finishing

222 E. Willow — Wheaton, Ill.

Now . . . for the first time—
A FLUID POWER TRAINING PROGRAM
to fill industry's need for trained personnel

Hitchcock's NEW "job-related" home study course
"INSTALLATION, OPERATION and MAINTENANCE of FLUID POWER EQUIPMENT

An up-to-date practical course of study covering Theory, Fundamentals of operation, Application, Diagnosis and Repair for all types of hydraulic and pneumatic equipment and controls.

The problem of developing properly trained, qualified personnel to install, operate and maintain FLUID POWER EQUIPMENT becomes greater day by day. Design simplification and "advanced mechanization" continually expands and increases the uses of FLUID POWER to increase production and operating efficiency in all phases of industry.

Hitchcock Publishing collaborated with two of the nation's leading fluid power authorities to develop this program. Now, men can be trained "on-the-job" through home-study and daily direction in the development of practical skills in fluid power.

Hitchcock's course is available to company sponsored group enrollments or individuals on a low-cost basis in a convenient, practical 18 chapter study course. Upon completion of the course, students will attend a 2 day work-shop session for practical review, application and discussion of the material covered.

Investigate **the advantages of Hitchcock's FLUID POWER home-study course for training individuals to fill your fluid power personnel needs. You'll benefit through increased production and operating efficiency. Send for complete information and enrollment forms today !**

HITCHCOCK Publishing Company / Dept. of Training & Education, Industrial Services Division, 222 E. WILLOW AVE., WHEATON, ILLINOIS

No Postage Stamp Necessary if Mailed in the U.S.

Postage will be paid by

GRINDING and FINISHING
A Hitchcock Publication
P.O. Box 76, Village Station
NEW YORK CITY, NEW YORK

District Managers
GRINDING and FINISHING

EASTERN DIVISION

Dan E. Reardon, V. P. in charge
c/o Hitchcock Publishing Co.
55 West 42nd Street
New York 36, N.Y.
Telephone: LAckawanna 4-4528
Home Address: Box 1,
South Glastonbury, Conn.
Home Telephone: MEdford 3-7083

NEW ENGLAND
John Pickering Jr.
c/o Hitchcock Publishing Co.
Box No. 29, Andover, Mass.
Telephone: Greenleaf 5-0499

NEW YORK, METROPOLITAN AREA, EASTERN PENNA., CENTRAL N. Y. STATE, N. J. MD., DELA., D. of C.
Ralph Payne
c/o Hitchcock Publishing Co.
55 West 42nd Street
New York 36, N.Y.
Telephone: LAckawanna 4-4528

CENTRAL DIVISION

SOUTHERN OHIO, INDIANA, KENTUCKY
Henry J. Smith, V.P. in charge
c/o Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrose 5-1000

MICHIGAN, NORTHERN IND., NORTHWESTERN OHIO.
William E. Jacobs
c/o Hitchcock Publishing Co.
18055 James Couzens Highway
Detroit 35, Michigan
Telephone: DIamond 1-9525

ILLINOIS, IOWA, MO., WISC., MINN., UPPER PENINSULA of MICH., and S. DAKOTA
Robert G. Bolinder
c/o Hitchcock Publishing Co.
Wheaton, Illinois
Telephone: MOntrose 5-1000

WESTERN NEW YORK STATE, WESTERN PENNA., EASTERN OHIO
Ralph E. Helfrick
1507 Edgefield Road
Cleveland 24, Ohio
Telephone: HIllcrest 2-0189

WESTERN DIVISION

CALIFORNIA, ARIZONA
Keith H. Evans
3723 Wilshire Boulevard
Los Angeles 5, California
Telephone: DUnkirk 8-2981
and
Room 225-515 Market Street Building
San Francisco 5, California
Telephone: YUkon 2-4280

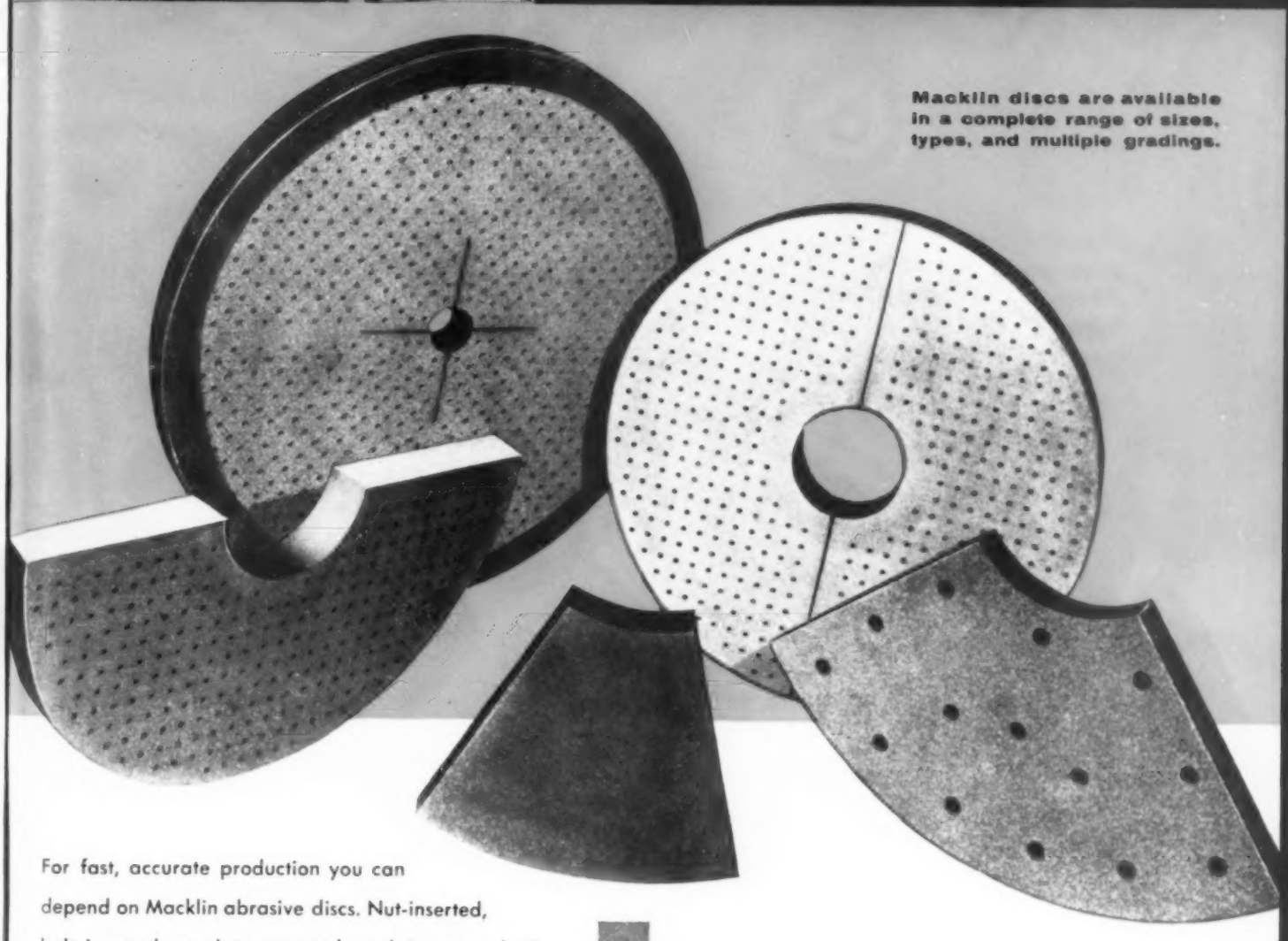
OREGON, WASHINGTON
Lloyd Thorpe
212 General Insurance Building
Seattle 5, Washington
Phone: MElrose 3-4242

HITCHCOCK PUBLISHING CO. • Phone MO 5-1000 • Wheaton, Ill.

whatever your
disc grinding job.....

MACKLIN

has a money saving answer!



Macklin discs are available in a complete range of sizes, types, and multiple gradings.

For fast, accurate production you can depend on Macklin abrasive discs. Nut-inserted, bolt inserted, or plate mounted, each is custom built to your exact job requirements for standard disc grinding or vertical surface grinding.

Exactly matched, and uniform throughout, Macklin discs require less dressing, give greater stock removal and longer wheel life. *See for yourself* how Macklin discs cut free and clean; mount secure and flat. Consult your Macklin Sales Engineer or your nearest Macklin distributor. You'll find it's a money saving move!

GRINDING WHEELS

MACKLIN company

DEPT. 63, JACKSON, MICH.

CYLINDRICAL GRINDING WHEELS • CENTERLESS GRINDING WHEELS • TOOL ROOM WHEELS • WIREBOUND CYLINDER WHEELS • FOUNDRY WHEELS • SEGMENTED WHEELS • CUT-OFF WHEELS

FLEXLITE RAISED HUB GRINDING WHEELS

Safety guard removed to illustrate full view of Flexlite Grinding Wheel

PEAK EFFICIENCY...PEAK STAMINA for high-speed portable grinding

From start to finish, U. S. Flexlite is the wheel that's built to reduce overhead. For smoothing and finishing welds, this is the most efficient, durable wheel in portable grinding. Comes in two types:

A24-H-BWD designed for use where fast rate of removal is the prime objective.

A24-Q-BWD designed for top efficiency and long life. Recommended for heavy-type applications such as heavy-gauge metals and heavy welds.

U.S. Flexlite Raised Hub Wheels are built for the utmost safety—their manufacture is controlled by unerring electronics. Layers of fiber glass reinforce the wheel. These wheels give you a cost-saving advantage right from the start.

• • •

Ask your "U. S." Distributor, or call or write U. S. Rubber, 10 Eagle St., Providence, R. I., or your local "U. S." District Office, or the address below.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.